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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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EDITORIAL NOTES—GAS, &c.

The Late Chairman and the New.

FOR the first time after the death of their distinguished Chairman, Sir George Livesey, the proprietors of the South Metropolitan Gas Company met on Thursday. The Company was the centre of Sir George's work, and the seat of inception of his remarkable and successful exploits in engineering, in administration, and in improving the conditions of industrial labour. Very naturally, there were full hearts at the meeting. It was the first occasion for many a long year that the chair was occupied by another—the old and intimate colleague, Mr. Robert Morton. From the midst of the shareholders, there came the resolution and the words of men representing all classes of the proprietary which place on record the profoundest sentiments of the heart regarding the achievements, the worth, the personal qualities of the late Chairman, and the sense of individual and collective loss to the Company and to the gas industry at large. Well chosen as were the words employed, transparent as they are of the prevailing feeling, there remains the knowledge of utter inadequacy. But there is the consolation to Lady Livesey and the immediate relatives that, though in body dead, he, the loss of whose presence and activity we all so deeply mourn, yet lives in the hearts of many thousands.

The meeting, however, was called specially for the election of a Director to fill the vacancy on the Board. This is a proprietors' matter; it is no concern of the Directors to elect a colleague even temporarily. The responsibility of doing the right thing on this occasion was a heavy one; but there was only one appropriate choice, and a choice that fulfils a desire of him whom the proprietors revered and trusted. The honour has fallen, without opposition, on Mr. Charles Carpenter, as it was confidently hoped and expected it would do. It is a unanimous choice; and what is more, the proprietors now know definitely that Mr. Robert Morton, who has been proud to occupy even for a brief space the place of honour at the Board in succession to Sir George will, with the consent of his colleagues, abdicate the position in favour of the new Director. This was practically all predestined, subject, of course, to endorsement. "You "will have to carry on this work when I am gone," were the words Sir George addressed to Mr. Carpenter in one of the many friendly chats regarding the future. In those words for Mr. Carpenter there is a sacred charge. But we all know sufficient of his strength of purpose, his fair dealing with men, his capacity for hard work and for meeting exigent circumstances, his technical and administrative accomplishments, to have the utmost trust that the charge is in safe keeping. He has also pledged himself time and again to co-partnership; and as their chief he has the full confidence of the whole army of employees. To follow Sir George as the head of the great Company carries with it an immense responsibility, but Mr. Carpenter is not the man to shirk it, knowing as he does that it was the wish of his old leader and is the desire of the Board and of the general body of proprietors. There is strength in such knowledge. "I accept "that honour with regret, but not with dismay." Courage and confidence are in the words; and those are qualities that are characteristic.

In his new position as Chairman of the Company, Mr. Carpenter will be following the spirit of the suggestions of Sir George as to his successor being something more than the head director of the administrative work in the Board-room. He will still devote—his years permit it—his activities to the general work of the Company; and thus the lessened need to immediately appoint a successor to the Chief Engineership. This, too, is in accord with the views expressed by the Right Hon. A. J. Balfour. Speaking at the Co-Partnership Association meeting last Tuesday, he said: "The result of my own personal observation upon the way the "business of the world is conducted is that the really good "work of an original mind is always carried on by an indi-"vidual, but that does not mean an uncontrolled individual, "nor an individual without associates." However, all the traditions of the South Metropolitan Gas Company will be safe in the hands of, and be respected by, Mr. Carpenter; and in stepping on to the high road of his administrative career, the fervent wishes of many friends, including ourselves, for abundant success will go with him. In what he does, too, he is assured of the cordial co-operation of colleagues and of a body of officers and men of whom any head of an industrial concern would be proud.

Co-Partnership from Philosophic & Political Planes.

WE cannot treat lightly the value of the support that the principles of co-partnership have received by enlisting in their furtherance the heart and voice of such a philosopher and student of the men and affairs of our times as the Right Hon. A. J. Balfour. He is the President for the year of the Labour Co-Partnership Association; and in that capacity he addressed the annual meeting last Tuesday. The Association is a non-political body; and its very tenets show that it is divided by ever-widening space from the extremists who are without intermission seeking to cleave the bonds of our social constitution by violent means. On the platform at the meeting were labour members of Parliament, with their President for the year—the Prime Minister during the last Conservative *régime!* Such a combination shows that, in industrial co-partnership, we have the place and the means for an effective breaking away from the ultraists who seek, by wasteful and disorganizing methods, to create an industrial upheaval. In co-partnership too—we say it with all the emphasis at command—there is the strongest weapon yet forged with which to annihilate that protean monster Socialism, and the strongest sedative to those irritating influences that induce intermittent, it may be, but albeit ever-menacing, dispute in a labour world governed according to conventional wont.

Mr. Balfour, in his address, through his independent view, opens one's eyes to new phases of the question. It is valuable to have the thoughts and judgment on any subject of common importance of the trained and uncontrolled observer of the world's movements. We have here in Mr. Balfour such a firm believer in co-partnership that he does not dismiss as useless any scheme that goes only partially along the road to what he characterizes the "complete" co-partnership. The "complete" co-partnership is the highest development of the system; and the highest development of the system is the one that has been adopted with such marvellous success in the gas industry. Mr. Balfour carried with him an audience composed of all sorts and conditions of men when, in language that was eloquent in its simplicity and toned by a heartfelt sympathy and regard, he bore testimony to the work of Sir George Livesey, "of whom," he said, "they could not think without feelings of reverence, affection, "and regret." He persevered to accomplish a humanly ideal system. In face of what he did successfully at the high level, in face of what others have done successfully at a lower level, there is no sense in still referring to such schemes as being merely theoretical or experimental. They have been put to the proof of practice. They have stood the test of time; they have shown themselves safe against the storms that beat against the edifices of industry. Where there is co-partnership, there have been no strikes, no disputes calling for the external aids of a conciliation board or an arbitrator. Co-partnership rises superior to all such. Yet some writers and some speakers think that there is still a groping among ways and means by those who desire industrial peace for a mode of composing the rivalries of capital and labour, and bringing to a higher pitch mutual friendship, interest, and esteem. By weight, if not by number, the proof is given that the way has been found for doing all this and for going beyond it, by giving an opportunity to capitalists of performing a material part in raising the social status of

those through whom and by whom they are able to put their capital to the best use.

"To the best use" are words that may be reiterated. It cannot be expected that the highest economic effects, the highest development of interest and ability, can be secured among employees in the industrial world on the old wages system that has declared itself wanting by the experiences and lessons of years. And equally the lessons and experiences of years have declared to all who have chosen to heed them that the patching-up of the wages system by schemes the benefits in which are only conditional on the ills (and their consequences) to which flesh is heir is of no avail in the realizing of the objects that are achieved by co-partnership. Such schemes are good so far as they go; but they do not go far enough. Something more is wanted, and that something is found in co-partnership—not one cast-iron form of co-partnership, but the form that best suits any given industry, the conditions, and the men engaged. There cannot be one ideal of universal application to the whole world of employment; nor is it submitted as a sanguine belief that the best that has been done to fit a certain set of circumstances may never be improved.

Like Sir George Livesey, Mr. Balfour pleads that this question shall be considered on broader grounds than the balance-sheet, though there cannot be improvement in a man's efficiency, there cannot be any enlivening of the old unconscious interest of a man in his work, unless it emerges in economic advantage. The effects are diversified where a number of human brains and physical powers of varying degree are put to extra exertion by the stimulating agency of greater personal interest and reward, and the knowledge of a personal property as a shareholder in the business. These effects cannot possibly be measured; but nevertheless they have existence. "Let us be makers of men" says Professor Pigou; and Mr. Balfour has the confidence inspired by his penetrating examination into this subject that, by increasing the interest of the employees, abilities will be developed, and the recognition of individual responsibility will be broadened. In this way, men of higher stamp and character will be developed, the tension between capital and labour will be relaxed, there will be less irritation, animosities slumbering or awake will be mollified if not completely eliminated, and the disturbing work of the socialistic demagogue will be largely eclipsed. We are not so foolish as to say that co-partnership is going to produce an industrial millennium; but, where adopted, it will go a satisfactory way along the road to that end. On behalf of the co-partners of the gas industry (whose numbers are rapidly increasing), Mr. Balfour is heartily thanked for his inspiring address, of which the principal parts are published on succeeding pages.

The Supply of Shareholders' Lists.

THE attempt of the Gaslight and Coke Company to crush out the impertinences, in respect of demands for shareholders' lists, of the well-known clique of City Company promoters and their tools has not been successful in the Law Courts; but better to have fought and failed than not to have fought at all. The matter having been brought before the Courts has accentuated the grave necessity that exists for an amendment of the law in question, so as to give Directors of Companies a discretionary power in supplying lists of shareholders, subject to an appeal to the Courts, in order that applicants for such lists may have an opportunity of proving that their motives are irreproachable, and of obtaining a judicial order instructing the preparation of the list in terms of the Act. The matter stands thus: Section 10 of the Companies Clauses Act of 1845 provides for the inspection of shareholders' address books by shareholders so desiring, and for a copy being provided on payment of 6d. for every 100 words. H. Percy Davies is a sort of factotum to the Eaton promoting coterie; and he is the holder of £100 worth of stock in the Gaslight and Coke Company. As a shareholder within the meaning of the Act—insignificant though he be in that capacity—he applied for a list of the proprietors and their addresses or the amendment to date of a list already in his, or his employers', possession. This was refused him by the Company in the interests, and for the protection, of the remaining proprietors, who hold among them between £25,000,000 and £26,000,000 of stock. Eventually Davies applied for a *mandamus*, instructing the Company to comply with his request under clause 10 of the 1845 Act. The Company manifestly were by no means satisfied that they would succeed on the main issue, unless they could get the Court to assent to an inquiry into the motives for which Davies required the list. Before this matter was argued in Court, however, there were signs of an abject nervousness on the part of the plaintiff and his superior allies to come out into the open. Subpœnas for the production of books and for the examination of Directors were, as reported last week, successfully resisted through Counsel by the persons concerned, and when the Gaslight and Coke Company's Counsel last Thursday asked for the proof of signatures to Davies' letters, a Solicitor was put into the box to attest their genuineness—not Davies himself. The wily ones are clearly not to be caught neglecting the employment of every possible shield.

The first question in cross-examination brought from Mr. Justice Warrington a request that Counsel should justify the proposed line of cross-examination, and establish the relevancy to the issue of inquiring into the plaintiff's motives for requiring a list of the proprietors. His Lordship was not by any means unsympathetic towards the Company. He quite appreciated that a Company of the standing of the Gaslight and Coke would not have come into Court for any frivolous reason; and he gave Counsel the utmost liberty to show whether there existed a loophole through which motives could be inquired into, and matters be introduced relevant to the point at issue. The upshot of a long argument and plentiful reference to antecedent judgments was that his Lordship held that the Court had no jurisdiction to go into the question of motive, and that the right claimed by plaintiff was one, as the law stands, incidental to property of which he is the holder. The whole position appears to be absolutely case-bound. It is regrettable. The position, however, is exactly as it was before, so that no ground has been lost in beating back those who have adopted the gas industry for their marauding expeditions. But it would have been extremely serviceable, as a further caution to gas investors, to have had the exposure looked for from the cross-examination of Davies, with the testimony of Mr. Corbet Woodall, as Governor of the Gaslight and Coke Company, as to the character and influence of these latter-day promotions.

There was a second case in which the Water-Works, Lighting, and Power Investment Corporation—one of the principal channels of the operations of this promoting clique—were the plaintiffs and the Brentford Gas Company the defendants. In this instance, the plaintiff Company, who were the applicants for a list of proprietors, held the ludicrous amount of £1 of stock; and, even in this case, they would have succeeded had the private Acts of the Company not specified the nominal value of the shares in the Company at a much higher amount than £1, and directed that the rights and privileges of shareholders should only attach to holders of such shares or of aliquot parts thereof. The Brentford Company by this technical objection succeeded in staving off these people for the time being; but the latter can, of course, easily put themselves in a position to claim the particular privilege of a shareholder, which the amount of their holding proves is the only thing they really care about in the prosecution of their miserable business. The making of an application, in virtue of the possession of £1 of stock, for a list of the proprietors of a large Company like the Brentford, is the best possible certificate to the consummate impudence of these people; and no reasonable being can say that their procedure in this and other cases is not a flagrant abuse of the intentions of the Legislature in 1845, and the privileges accorded by the Act. There is really no measure to the amount of money that has been lost through this too readily acquired privilege, not only in connection with gas undertakings but other commercial and industrial enterprise. But the words of the Act are so broad that even the Courts cannot differentiate between the marauder and the person of the purest and most disinterested motives, so long as he is a shareholder within the meaning of the governing Acts.

The only thing that can now possibly be done to obtain relief from the demands of these men, and to protect gas investors from their subtleties, is the amendment of the Act of 1845. But that is much more easily said than done. The matter, however, is one that should be agitated. At the last meeting of the Gas Companies' Protection Association, a suggestion was made by Mr. Thomas May, and endorsed by the Chairman (Mr. H. E. Jones), that it would be a very useful thing to compile a list of members of Parliament who are shareholders in gas companies. If and when such a list is compiled, one of the first uses that could be made of it

would be to address to those members of Parliament letters calling attention to this particular evil, for which, on public grounds, remedy is urgently needed. The remedy would be that suggested in our opening paragraph—a discretionary power, with right of appeal to the Law Courts, and judicial inquiry into motives. That is a matter for further consideration; but it may be suggested that it is a particularly suitable movement for the Gas Companies' Protection Association to take up, and to ascertain by inquiry what, if anything, can be done.

What is to be the course of Gas Companies meanwhile? Some time ago we urged upon the Chairmen of Gas Companies to warn the shareholders, at their meetings, against being entrapped by alluring gas prospectuses or share advertisements, without advice—not advice obtained from the promoters or from any stranger who might merely be a hireling of the promoter put forward to inveigle the imprudent. We will go farther now, and say that, in view of the position of the law as to the supply of shareholders' lists, on an application being made for such a list—no matter from whence the application emanates, if the ultimate purpose for which the list is required is unknown—the shareholders should be promptly and specially cautioned by circular-letter against paying any attention to prospectuses of gas companies, unless positively assured by a reliable person that the venture is one that is being launched under proper auspices, or that the capital is being required for a concern of commendable prospects. It is important, too, that companies and their officials should not, because an application is made through a stranger or even through (say) a local solicitor who is a shareholder, play into the hands of these people. Attention to this suggestion will render largely nugatory the possession of a list of shareholders by these company promoters. Be it also noted that there is no time-limit defined by the Act within which there must be compliance with the request made by an applicant for a list of shareholders.

Uniformity in Quality.

A SPECIAL article appeared in the "Engineering Supple-"ment" to "The Times" last Wednesday, under the heading of "The Quality of London Gas." It was from "An En-"gineering Correspondent," and is a supplement to an article that appeared on May 8 last year, in which an examination was made of the official figures relating to the testing of gas under the new order of things in London. We cannot see that the article imparts anything of much value to a question the attractions of which are purely technical; if value there be in it, it is that it certifies a greater qualitative uniformity in supply between company and company and between period and period than perhaps the general public would be charitable enough to give the companies credit for. Next to a satisfactory standard of quality, the author of the article advocates uniformity in supply over a district, and as far as possible continuously. Of course, that is an ideal condition which is subject to many disturbing influences, which the most statesmanlike management cannot always deal with and counteract in such a manner as to prevent a moderate departure from uniformity. Market considerations, the vagaries of the demand for gas through rapid changes in atmospherical conditions, and even erratic temperatures, may be the fundamental causes of variations in constitution and character of supply, although not necessarily such as to be conspicuously marked. The author takes the official tests in certain weeks over the past two years, commencing with the week ending Dec. 15, 1906, proceeding with that ending on Feb. 23, 1907, and continuing with those ending on June 6 and Aug. 29, 1908. There we get fairly distinctive times and seasonal conditions. During the period, too, the London Companies have had to swerve from their conventional patronage of the Durham coal-fields, and place considerable orders in Yorkshire and other districts. In view of these differences in season and material, it is noteworthy that so little change should have taken place in the gas supplied to the public. Contrasting the results in the weeks taken by the writer of the article in "The Times"—that is to say, the results from the fourteen testing-stations of the Gaslight and Coke Company, the six of the South Metropolitan Gas Company, and the two of the Commercial Gas Company—it is seen that the illuminating power of the gas has been maintained, and that the diminution in heating power has been but slight.

The author points out that, by the more exact method of adjusting the air supply to the argand test-burner prescribed by the Gas Referees on Jan. 1, 1907, the illuminating power tests will have been enhanced by $\frac{1}{4}$ to $\frac{1}{2}$ candle; and this is about the actual increase in the returns, which, on the average, is 0·27 candle—being 0·32, 0·43, and 0·06 candle for the respective Companies. It may be suggested to the writer that the relationship between the refined adjustment and the fractionally higher illuminating power is not by any means proved by his figures. By the end of August last, no doubt the carbonization of Durham coal had increased in the London works and the use of Yorkshire and other varieties had lessened, and possibly, too, he will find that the Gaslight and Coke Company were employing less carburetted water gas in the summer weeks of this year taken in the comparison than they were doing in the winter weeks of 1906 and 1907. It is noted that the calories per candle power, according to the comparison, fell by an average of 0·22, or about 3 per cent.; while the actual heating power only dropped by 1 per cent. This disparity is no doubt explained by the apparent rise of about $1\frac{1}{2}$ per cent. in the illuminating power. The tests for sulphur show that sulphuretted hydrogen was uniformly absent, and that the sulphur compounds in the case of the Commercial Company have received a substantial curtailment—viz., 17·67 grains per 100 cubic feet. The Gaslight and Coke Company have a diminution of 0·25 grain; and the South Metropolitan Company of 4·78 grains. The illuminating power tests show that, though the standard is 14 in the cases of the South Metropolitan and Commercial Companies and 16 in the case of the Gaslight and Coke Company, the actual illuminating powers of the gas distributed do not vary much. The Gaslight and Coke Company's figures are round about $16\frac{3}{4}$ candles, with a top figure of 17·12 candles; while the South Metropolitan figures are in the neighbourhood of $16\frac{1}{2}$ candles, with a top figure of 16·93 candles. The Commercial Company's returns are all approximately $15\frac{1}{2}$ candles. It must not be forgotten that the South Metropolitan Company have not yet discovered the means, with their present carbonizing plant, of making, from coal only, gas nearer than that distributed at present to the 14-candle standard as tested by the modern method; but the auxiliary of carburetted water gas puts into the hands of the two other Companies the ability to regulate the supply closer to their parliamentary standards. However, considering the vicissitudes that mark the course of gas manufacture, it is gratifying to find that there is so little variation in the quality of the London product, though under three different administrations.

Private Bills and "Blackmail."

SOME rather ineloquent things were said in regard to parliamentary procedure on Private Bills last Friday by Mr. Lloyd-George, during a debate on a clause in the Port of London Bill. In part there is concurrence with the right hon. gentleman; but it is impossible to subscribe to all that he says, or to the manner of expression. The clause in question of the Port of London Bill proposes to give the Port Authority power to construct new works, and acquire land for the purpose, merely by the simple plan of obtaining the consent of the Board of Trade. In our opinion, it would be mischievous for the Board to have such latitude in power as this, which would wipe out, within the field of operations of the Port Authority, the parliamentary protection now enjoyed by owners throughout the country. The strength of the opposition to the proposal in the House induced the Board to make a concession to the extent that, before granting an order under the section authorizing the acquisition of land, the Board should appoint an impartial person to hold an inquiry on their behalf. This has not sufficed to produce satisfaction. There is much to be said in favour of the simplification of parliamentary procedure for the acquisition of powers; but simplification should not be created at the expense of the protection of private or other rights. But this is what the novel proposal means that the Board of Trade have secured by the aid of the majority the Government have at command. The plan, however, has the further restriction attached to it that, after inquiry, the schemes to which it is proposed the Board shall give their uncontrolled assent shall lie on the table of the House for at least thirty days, in order to give opportunities for objections to be stated.

Why the Port Authority should receive preferential treatment of this kind is not clear. The only reason—and that a very flimsy one—that can be extracted from the debate is the one put forward by Mr. Lloyd-George, in the remark

that the greatest port in the world should not have to suffer the inconvenience and the expense of going before a Parliamentary Committee, in order to get the facilities that they require. There is a hollowness in the contention. If the greatest Port Authority are to have their path made easy in this way, and be granted authority which may be wielded in an autocratic and oppressive fashion, why should not the greatest gas company or the greatest railway company, be granted similar rights? Mere greatness should not be a reason for preferential power. The larger the undertaking, perhaps the more necessary is it for their plans to be thoroughly reviewed in Parliament; and certainly, generally speaking, the cost incurred by such concerns in making applications to Parliament is less in proportion to that which falls upon much smaller concerns for a similar purpose. All applications to Parliament are expensive—especially opposed ones; but we are not going so far as to endorse Mr. Lloyd-George in his loosely expressed assertion that "very "often proceedings before Committees were purely black-"mailing ones, brought merely with the object of getting "a big price from a company. It was done deliberately, "and as a matter of policy." That is where the protection of Parliament and inquiry before Committees are, or should be, valuable in bringing about the defeat of the blackmailers. We are entirely at one, however, with the statement of the Chancellor of the Exchequer that "Parliament "should not be a sort of huge blackmailing machine for the "purpose of extracting an extravagant price out of great "commercial and industrial enterprises." It would be well and welcomed if the expenses of Private Bill procedure could be lightened, and the procedure made more efficient; but the protection to owners of the present system should not be forfeited merely for the sake of securing economy. If Parliament gives this power to the Port Authority, then there will be ample reason for other large enterprises asking for the same facilities.

Livesey Memorial Meeting.

Readers are asked to remember the meeting called by a Special Committee of the Council of the Institution of Gas Engineers—consisting of the President (Mr. Thomas Glover), the Vice-Presidents (Mr. James W. Helps and Mr. Alex. Wilson), Mr. Charles Hunt, and Mr. S. Y. Shoubridge—to consider their proposals and any further suggestions regarding a suitable memorial by the gas industry to Sir George Livesey. The meeting will be held next Thursday, at the Institution of Mechanical Engineers, at 2.30. It is hoped by the Committee that at this meeting "all companies and corporations owning gas-works, as well as others connected with the gas industry in various ways, will be represented," which is a broad invitation to all having part or lot in the industry to be present on this occasion.

Direct Administration v. Contract Work.

The people of Leeds had decided that they would have no more of the Works Department, said a member of the City Council during the proceedings last week; and to this he added the assertion that it was against the interest of large ratepayers that the Corporation should, with their money, place themselves in competition with them in their business. The occasion was the discussion of a resolution rescinding the report of a Special Committee previously adopted on the subject of the establishment of a Works Department, and agreeing that wherever practicable the Council should revert to the course of letting by contract painting, building, and other special work. It was not to be supposed that a proposition which would affect to such an extent as this did the policy of increasing municipal responsibilities, would be allowed to pass without a struggle on the part of the supporters of the policy; and, as a matter of fact, it was not. Indeed, after more than two hours' talk on the question, the resolution was finally put to the meeting while one of the Socialist members was actually haranguing the Council. The mover of the motion gave as his reasons for doing so that his experience was that work done by direct labour was not carefully thought out in every detail before it was commenced, and that it had led in almost every case to much unnecessary expenditure. Further, it was an interference with private trading, and was a Socialist measure; and to abolish it would be in the best interests of the ratepayers and the citizens generally, the traders, and the better class of workers. In the course of the discussion, one member went so far as to assert that he had been sent to the Council because business people felt that they were going to be ruined by the extension of municipal trading. It was, he added, a matter which affected between twenty and thirty thousand shopkeepers; and if they were subject to such competition, they would not be able to pay the rates, and the city would suffer. On the other side, it was remarked that the Sheffield Corporation, at a time when no Labour man or Socialist was a member, started a Works Department to break down a ring of contractors; and the same thing had happened with regard to the London County Council. This view did not, as already remarked, prevail with the majority of the Council; but some members expressed doubt as to whether the passing of the resolution would make any difference in practice. This is for the ratepayers to see to; we can merely here chronicle the fact that the members have in principle come to an adverse decision with reference to the maintenance of a Municipal Works Department.

A Special Course of Lectures.

In connection with the Department of Fuel and Gas Engineering at the Leeds University, it will be seen, from a communication received from Professor W. A. Bone, D.Sc., F.R.S., that arrangements have been made for an extension of its usefulness; and we ask for it the earnest consideration of readers residing within a readily accessible distance from Leeds, and who have assistants and pupils who would derive benefit from the new movement. The proposal is to have a special course of fourteen lectures on the manufacture of coal gas and six lectures on the distribution of coal gas, during the period commencing on Jan. 13 and ending on March 18. A synopsis of the lectures is included in Dr. Bone's communication. The names of the lecturers will alone be a strong recommendation. Dr. Harold G. Colman has made himself responsible for the course on the manufacture of gas, and Mr. Walter Hole for those on distribution. The fee for the whole course is to be only £1 1s.; and, in order to enable students living at a distance from Leeds to take advantage of the proffered opportunity, the lectures have been arranged so that two can be taken on one visit by staying a night, on (unless other accommodation is preferred) very moderate terms, as stated elsewhere, at the Hall of Residence of the University. There is one important point, that the scheme can only be completed on condition that there is a sufficient attendance to warrant proceeding with the matter. This being so, the names of intending students should be forwarded (as directed) without delay.

Lights of London in Foggy Weather.

The middle of last week—Wednesday in particular—London was visited by what is described in one meteorological report as a "remarkable atmospheric phenomenon." There was fog—more or less heavy—in the morning of Wednesday; towards the middle of the day, the fog near the surface cleared, but the upper atmosphere got denser; and in the afternoon darkness reigned supreme. The result was that in streets and business premises gas and electric lighting was largely requisitioned—in places, interior artificial lighting had to proceed the whole day through. It was interesting during the fog to take a run through the City streets. Outside the Stock Exchange, the scintillating high-pressure gas-lamps, which gave life even in the prevailing dense murkiness, penetrated the fog when at its worst, and cast a flood of light all round. Near by, were the flame arc lamps. Through the gloom, they had a far-away, dead appearance; and their area of illumination was defined in a very marked manner by their globes. This fact noted near the Mansion House was confirmed in Cannon Street, and again at Blackfriars Bridge approach—a striking comparison with the last-named lamps being afforded by the Queen Victoria Street high-pressure gas-lamps. On Thursday morning darkness again reigned The gas-lamps in the City were alight as business men were proceeding to their offices. The electric lamps were not—at all events near Blackfriars Bridge and in Bridge Street—assisting in the work of illuminating the dreary streets. Little bits of economy with the electricity suppliers are of great importance; but then they have not the storage facilities of the gas companies. That is to their disadvantage; but storage is an advantage with gas that should be duly weighed by the public lighting authorities. We contend that the means of illumination that is superior in the worst of weather should determine the form of illumination that our public lighting authorities should adopt.

THE LATE SIR GEORGE LIVESEY'S BEQUESTS.

The King's Hospital Fund to Receive a Handsome Amount.

We are now in a position to give a few further particulars as to the disposition of the eventual residue of the estate of the late Sir George Livesey.

It may be remembered that in the "Journal" for Oct. 20, p. 183, it was announced that (subject to Lady Livesey's life interest in the amount) there would be two sums, amounting in the aggregate to over £20,000, set aside out of the residue to form funds for the benefit of the workmen of the South Metropolitan and the South Suburban Gas Companies.

It now appears that (still subject to Lady Livesey's life interest) out of the remainder of the estate £10,000 is to be paid to the King's Hospital Fund; while the balance of the residue, subject to certain legacies, is to be divided into 100 parts, distributed as follows:—

British and Foreign Bible Society	20 parts
Church Missionary Society	10 ,,
London Missionary Society	10 ,,
London City Mission	10 ,,
Church Pastoral Aid Society	10 ,,
Wesleyan Missionary Society	4 ,,
Presbyterian English Missionary Society	4 ,,
Baptist Missionary Society	4 ,,
United Kingdom Alliance	5 ,,
National Temperance League	5 ,,
Band of Hope Union	5 ,,
Church of England Temperance Society	5 ,,
London Temperance Hospital	5 ,,
Lord's Day Observance Society	3 ,,

THE GERMAN GAS AND ELECTRICITY TAX.

The clauses of the German Budget proposals relating to the taxation of gas and electricity continue to meet with destructive criticism throughout the Empire. Among recent comments of interest may be mentioned an article in the "Journal für Gasbeleuchtung" of the 28th ult., in which the projected taxation is held to be fundamentally wrong because it bears directly on industry. It is pointed out that gas and electricity are the modern agents for the transmission of power, and are hygienically and technically preferable to independent boiler installations. But, if taxation of the class to which the project belongs can no longer be avoided in Germany, it is argued that it would be better to go to the prime source, and tax both native and imported coal. A tax of 30 pf. (3½d.) per ton on coal, and of 20 pf. (2½d.) per ton on lignite or brown coal, would at the present time produce a revenue of about 67 millions of marks, or (say) 3⅓ millions sterling, per annum. This is much in excess of the estimated yield of the tax on gas and electricity, while it represents only about 2 per cent. on the market price of the coal. It is argued that an imposition of this order of magnitude would not be severely felt, as it is small compared with the periodical fluctuations in the price of the coal itself. A tax on coal would be distributed much more fairly among all people and all industries than one on gas and electricity, and would be relatively easy to collect—*e.g.*, at the pithead and the ports and frontier stations. A tax on coal might conduce to the husbanding of coal supplies and the concurrent greater development of the application of water power. But any tax on sources or agencies of power is deprecated.

The "Journal für Gasbeleuchtung" of the 5th inst. gives the text of a memorial which has been presented by the German Association of Gas and Water Engineers to the Reichstag against the gas and electricity tax.

The memorial recites that the Association represents by its membership practically all the gas-works and the gas industry of the country, and that this industry has developed quietly in the course of many decades to a position of great economical importance. Much labour and capital have been expended to make gas generally accessible as a means of lighting in dwellings, factories, and shops, and as a fuel in the kitchen and workshops. Within the last ten years, it has come into general use by the lower classes. Gas, and its chief bye-product coke, burn without smoke; and their use is therefore of extreme importance in towns from the hygienic standpoint. Tar and ammonia, which are bye-products of gas manufacture, furnish the raw material for the German colour industry and fertilizers for agriculture. Gas supply must, therefore, take its place alongside drainage and water supply as an indispensable and beneficent development of modern social activity. The gas industry, however, can only fulfil its important functions successfully if it is in a position to sell gas cheaply. Unfortunately, the raw materials, coal and oil, together with labour, are constantly increasing in cost; and the advances in manufacturing processes entail a considerably increased expenditure of capital. Consequently the price of gas in Germany has not been lowered to the extent which could be desired in the interest of the public. The Association, therefore, considers that the State authorities would confer a public benefit if they facilitated a reduction in the cost of manufacturing gas by removing the duty on gas oil and the impositions on the carriage of coal, &c., by rail and water ways. The projected taxation is a move in the opposite direction, and will lead to an increase in the price of gas. The scheme can only be described rightly as involving the taxation of technical progress.

The memorial next refers to the difficulty of applying the scheme of taxation and of collecting the tax in an equitable manner. Having regard to the heavy injury the tax would, as shown by the foregoing considerations, inflict very widely, it proceeds to beg the Reichstag to refuse its consent to the scheme in its entirety.

The same issue of the "Journal für Gasbeleuchtung" contains a voluminous review of the popular agitation in Germany against the gas tax. Resolutions of protest against it, which have been passed by Municipal Councils throughout the Empire, are quoted, as well as many similar resolutions by engineering and technical associations. A number of quotations from representative organs of the Daily Press are given, with the comprehensive statement that it has not been possible to find a single newspaper writing in favour of the gas tax.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 713.)

The Stock Exchange was last week again a victim to suspense long protracted in the negotiations for a European settlement. Business was at all times kept within restricted bounds; but the tendency varied from day to day, according as hopes or fears chanced to predominate. The tension made markets very sensitive—ready to take fright at the rustle of a political leaf. The opening was quiet and dull. All lines that could be affected by international clouds were gloomy; but foreign securities outside the storm area were firm. Tuesday was not active, but was more cheerful on a lighter view of things political. Consols rose a small fraction; and the Foreign and South African Markets looked up. The disposition to regard the outlook as promising continued on Wednesday; and prices in several leading lines strengthened. On Thursday, the tendency was irregular, and some markets were less firm. Friday was a good day, with an inquiry for gilt-edged investment lines; and the Foreign Market was firmer. But on Saturday uneasiness was renewed in regard to the Near Eastern tangle; and prices at once began to give way, though there was no heavy fall. In the Money Market, there was a good demand at the end of the month, and rates were fairly well maintained afterwards. Discount terms were somewhat relaxed. In the Gas Market, business in the aggregate was on a reduced scale; the lighter load being on the bigger issues. Some of the usually less active stocks were, however, prominently busy. A nice firm tendency was the general characteristic. In Gaslight and Coke issues, the ordinary was quieter, but not less steady. All transactions were within the limits of 100⅛ and 100¾. The secured issues were firm; the maximum changing hands at from 89¼ to 90, the preference at 106¼, and the debenture at 85½. South Metropolitan was inactive but steady at from 119½ to 120½; and the debenture was active at from 85½ to 86½. Nothing was marked in Commercials, except a couple of bargains in the 4 per cent. at 106½ and 108. Among the Suburban and Provincial group, Alliance old rose ¼, Bournemouth preference made 15¾, Brighton original marked 209½ and 210 (a rise of 1), Brentford old made 248, British 43, Hastings 5 per cent. 113 free, Lea Bridge 120⅝ and 121, Tottenham "A" 135¼, ditto "B" 107½, and West Ham 107¼ and 107¾. Ilford and Liverpool debentures, West Ham preference, and South Shields also advanced. In the Continental companies, Imperial was quiet, and was a point lower at from 181 to 181¾. Union was done at 110, European fully-paid at 23⅞ and 24, Tuscan at 10⅛ and 10¼, and Cagliari at 26. Among the undertakings of the remoter world, Buenos Ayres changed hands at from 11 to 11 5/16, Monte Video at 11⅞ and 11 9/16, Primitiva at from 5 13/16 to 5 15/16, ditto preference at 5 7/16 and 5 3/32, ditto debenture at from 95 to 95½, and River Plate at 13 1/16.

Ozone for Water Purification.—An ozone plant for purifying the water supply of Lindsay (Ont.) has lately been installed. The water comes in part from swamps and is exposed to much sewage pollution. It passes through a roughing filter containing 3 feet of coarse sand before entering the ozonizing tower, which is about 30 feet high. Here it passes down a number of vertical 4-inch tile-pipes into which the ozonized air is delivered by brass pipes.

Coal-Consuming Companies and the Mines (Eight Hours) Bill.—A number of gentlemen who for the most part control limited liability companies which would suffer severely if the above-named Bill became law, have lately applied to the Organizing Secretary of the Coal Consumers' Defence League (Mr. G. E. Raine) for advice as to the most appropriate way of making a protest, on behalf of their companies, to the House of Lords. He has consequently prepared some suggestions for resolutions to be forwarded to the House, and he will be glad to send them to any of our readers who would like to make use of them, on receipt of a communication to that effect at his address, Sanctuary House, Tothill Street, Westminster, S.W. As the Bill is likely to engage the consideration of the Lords at an early date, no time should be lost in moving in the matter. Mr. Raine is informed that protest resolutions of this character from business men will receive weighty consideration.

ELECTRICITY SUPPLY MEMORANDA.

What is Wrong with Electric Cooking and Heating?—Everything, According to Electricians—Commercial Difficulties in Residential Areas—How an Editor "Assists" a Gas Undertaking.

ELECTRICAL engineers cannot settle down to any common agreement on the question of the use of electricity for cooking and heating. Of course, they think such use is the thing needed; and the thing that ought to be. But the fact remains that people do not take kindly to the method electricians offer them for obtaining heat, nor to the appliances they offer for aiding in the culinary operations of a house. Some electrical engineers blame the tariffs, some the distribution system, some the cost of installation, some the initial expense of the appliances, and so we go on. But they will not admit, with the fluency employed in allocating blame, what people who have tried these complicated arrangements soon find out, that in every way they are costly, inefficient, and unreliable. According to the Blackpool Electrical Engineer, electricity at 1d. per unit for cooking and heating is cheaper than gas, much cleaner, and more convenient. But the Blackpool Engineer is dreaming. Let him continue to enjoy his unprofitable visions while practical people consider a few points from a couple of papers read before the Institution of Electrical Engineers.

Mr. W. R. Cooper was one of the authors. In his opinion, the tariffs require adjusting to encourage cooking and heating by electricity. Electricity tariffs are always being mauled about to suit the individual engineer's fancies. Mr. Cooper does not think anything above 1d. per unit will attract people to use electricity for the purposes in view. There is complete agreement with him; and there is no occasion to travel outside his paper for reasons for this belief. In considering the possibilities of electric heating, one is brought in the first place face to face with the inherent thermodynamic inefficiency of producing electric energy from coal. This is a matter upon which Mr. Cooper does not afford much information. He gives particulars of the cost of heating by a coal fire and by electricity; but he does not profess that the heating offered by the respective agents is on an equality. To heat a room of 1500 to 2000 cubic feet capacity by coal, the expenditure for fuel he calculates would be 4½d. to 5d. per day; while a radiator, using 1 kilowatt, would, if used continuously on full load, consume at least 12 units a day or 9 units if the radiator is put on half-load for half the time. From which figures it is evident even the 1d. per unit rate would not be an encouraging one, in comparison with coal or gas. On the subject of electric cooking, Mr. Cooper is no more convincing. He goes to Chicago and other parts of the States, as well as to Switzerland, for figures in support of electrical cooking, and to Fleming's, in our own West-end, for information as to the relative cost of cooking steaks and chops by gas and electricity, in which gas comes out best. But he is very weak on the subject. Like the Israelites, he cannot make bricks without straw. Heating water by electricity is out of it altogether. To raise 125 gallons through 80° Fahr. requires 100,000 B.Th.U., and, neglecting loss by radiation, this is equal to 29 kw-hours. Even at the low price of ½d. per unit, this comes to 1s. 2½d. per day. Mr. Cooper thinks that gas still suffers from the hot-water difficulty; and he exhibits want of knowledge as to how easily this difficulty can be overcome by amalgamating a small gas-heated boiler with the ordinary hot-water circulating system of a house. Notwithstanding that in one part of his paper he confesses that at 1d. per unit electric heating is not encouraging, he is beautifully sanguine when he says that at 1d. per unit electricity will take for cooking a position equal in importance to that occupied by gas. The wish is father to the thought. It is clear that Mr. Cooper does not know the position to which the gas-cooker has attained; nor does he appreciate that the gas-cooker in itself will deal with the whole range of the cooking requirements of a household.

So far there is not much encouragement to those engineers who are now looking longingly at electrical cooking and heating; and when a paper by Mr. J. Roberts is read in conjunction with that of Mr. Cooper, further confusion shadows the whole question. His paper is headed "Commercial Electric Heating." Well there can be no "commercial" electric heating even at the unencouraging price of 1d. per unit; and into that 1d. it is totally impossible to squeeze the whole of the average costs properly chargeable—generating, administrative, and capital—per unit of electricity. But Mr. Roberts considers that, without adding heating to what can be offered in the way of light, there will be but small chance of obtaining profitable business from the small householder, and the benefit of the metallic filament lamp will be chiefly confined to existing consumers. There is another view of the matter. The difficulties that would arise from the station engineer's point of view if the maximum demand of the average small residence increased (say) from 3 to 20 ampères, have led many station engineers to say that electricity ought only to be applied to such heating utensils as small kettles and flat irons; and there is no doubt in Mr. Roberts's mind that the size of the distribution mains at usual pressures would have to be so enormous to cater for the large demands for energy which universal domestic heating would entail that the capital cost would be prohibitive. The only alternative, in his opinion, seems to be to use higher distribution pressures in connection with transformers; and many of the present complications of low-tension networks will have to be swept away before there can be successful competition with the simple ways of the gas engineer. The cost of all this would have to be reckoned with.

There is some pretty plain speaking in this paper, though in the result we do not get much enlightenment on the main subject. There is, we are told, no doubt the electrical industry is groaning under the wicked practice of supplying such a pressure as 230 volts to the consumer's lamps. This has had the effect of making the cost of interior wiring bear the same relation to the cost of gas-piping as that obtaining in the respective distribution systems, and has slammed the door in the face of electrical cooking enterprise. What is the good of talking like this now; the electrical industry went in for higher pressures deliberately, and almost universally, with its eyes open. He also accuses modern forms of cooking utensils of being too much like laboratory arrangements. With this there is agreement. Mr. Roberts has a copper kettle at home; and he describes it in a not altogether friendly way, winding up with the declaration that, while all right for a person who knows how to protect himself against shocks, it would be little short of criminal to put the outfit in the hands of an ordinary servant girl. The general statement is advanced that, to get the full benefit of the safety and convenience of electricity, there must be a return to low pressures for both heating and lighting. High-pressure cooking apparatus is, from its nature, bound to be expensive, and possesses a facility for getting out of order. Ordinary cooking work, too, must only be done with equipment without flexible cords. Then it is remarked that the only feasible method of charging for all domestic purposes, in Mr. Roberts's view, is to adopt the Norwich system—fix a minimum figure depending upon the rateable value of the premises, and charge as much below 1d. per unit as is possible. Reading between the lines, the confession is found that gas has not much to fear from electricity in the cooking and heating fields of business. "If," says Mr. Roberts in the concluding lines of his paper, "electric heating on at least the same scale as it *is* being carried on by gas is only a dream, let us admit it frankly." It does not matter much whether or not the admission is made; the truth is palpable.

It has been seen from the foregoing that heating and cooking does not promise well in bringing "profit" into the coffers of the electrical undertakings, and especially is this so when the cost of the appliances and of installation in a purely residential district is considered. The address with which Mr. G. F. Pilditch inaugurated the session's work of the Dublin Section of the Institution of Electrical Engineers is illustrative of this. The most adverse condition with which the engineers of electricity stations have to contend is that of a poor load factor, and that is a state of things which there is little prospect of altering in a residential district. Casting round, the only means, and they wear a sorry complexion, that Mr. Pilditch can discover for improving the load is by extending the use of electric cooking and heating; and having made the discovery, he proceeds to show its impossible side. In the first place, we see that, in his judgment, the onus of effecting an extension to a really appreciable degree rests rather with the makers of such apparatus than with the supply engineers. That is a proposition difficult of comprehension. It is surely the business of the supply engineer to increase his load factor; he is not paid to shift his responsibilities on to the shoulders of other people. Leaving the question of the quarter in which reposes the duty of popularizing the use of electricity for cooking and heating, Mr. Pilditch gives other reasons why heating and cooking cannot be expected to make any great headway. In the case of heating apparatus the cost of wiring is a considerable percentage of the whole; and the present price of electric cooking appliances goes far to prohibit their extended use.

Discussing propaganda work, Mr. Pilditch does not believe in literature alone; he prefer pamphlets with a "follow-up" by a canvasser. His experience, however, is not such as to give him any great confidence even in this form of endeavouring to capture business in a residential area. In such a district—apart from the injury done to the electricity business by the malevolent statements made to experienced consumers concerning gas, which cast a doubt on the *bona fides* of the electrical people—there is the trouble that the tendency of the times is for householders to be nothing more than tenants and not houseowners, and on a yearly or three-years' agreement. Under such circumstances, it cannot be expected that they will incur the expense of installation; and a consumer's electricity account in such houses is not sufficient to warrant an undertaking in incurring the capital outlay. It is noted, too, that Mr. Pilditch has no great faith in local exhibitions; he prefers a well-furnished show-room, through which consumers have to pass when paying their accounts. Contrary to the experience of some other supply engineers, Mr. Pilditch does not find the metallic filament lamp—taking the aggregate effect on consumption—so very alarming. He gives a list of seven shops, and their consumption during the past September quarter in comparison with the corresponding period of 1906, when carbon filaments were the vogue. The period is hardly a fair one to take. It is a summer quarter, and a short-hour lighting period. In two of the shops, the consumption of electricity increased; in three there were very small reductions; in two heavier ones. But the net loss in the quarter in the seven shops was 77 units. That is not the class of experience usually published; but still it is an experience that we know can be confirmed in London. A far different statement, however, might be established for (say) the Christmas quarter.

The reference that appeared a fortnight since to an article in the "Burton Daily Mail" has been noted by the Editor of that paper; and he asserts that the suggestion made, that the article in

question (the purpose of which was to aid the business of the Electricity Department at the expense of the Gas Department) was "fathered" by Mr. Pringle, Corporation Electrical Engineer, "is, of course, too grotesque for words." Indeed! That is mere shuffling with the matter. Will the Editor say positively that no part of the information contained in the article emanated from Mr. Pringle or from his department? We shall await with some curiosity the answer that will be made to this question; and if he asserts what he now infers, we will put one more inquiry. The Editor avows that the uniform policy of the "Burton Daily Mail" "is to assist in every way possible in the development of the town's prosperity. . . . We shall do what we can to assist both concerns to extend their profit-making capabilities, and to multiply their public usefulness. We have no animosity towards the gas concern. On the contrary, we view its efficiency and its annual profit with great appreciation." These professions are read with a certain amount of misgiving; and we turn back to the article that started this discussion to see if there had been any misjudgment on our part. The headlines read: "Electricity in the Cottage: Cheaper, Better, and Healthier than Gas." This does not look like a "uniform policy" of steering a middle course, and doing all possible "to assist both concerns to extend their profit-making capabilities." We go on to read that the superiority of electric lighting to gas "admits of no doubt." "Electric light is not only less costly, but cleaner and healthier for every kind of building." "It does away with blackened ceilings, broken mantles, and vitiated atmosphere." In capital letters landlords are asked to "awake!" to these matters—"exaggerations" would be the better term. "The risk of fire," we are also told, "is with electric light greatly diminished." No, no! Mr. Editor, your professions of disinterestedness and friendliness to both supplies will not go down in face of statements that certify that all that is good is on one side, and that all that is bad and harmful is on the other. But all the statements are hackneyed where central station electrical engineers find it tiring work to obtain by fair means substantial additions to their business. Meantime the Editor has "fathered" all the statements in the article. We therefore ask him to take (say) a 50-candle light and 1000 hours' use as a basis, and show us how he makes out that electricity for domestic purposes is cheaper than incandescent gas lighting; tell us, too, in what way the bunsen gas-flame employed with a mantle vitiates the atmosphere; and also acquaint us with the grounds for his assertion that the risk of fire with electric light is greatly diminished. He cannot refuse to give us answers to these questions, as he takes full responsibility for the article in question. In replying to these inquiries, it is hoped he will not overlook the first question. A further suggestion for our electrical friends at Burton. It is that it would be as well to see that "Meteor" of the "Electrical Times" has made himself perfectly acquainted with the order of events, and the facts, before he again essays to render them assistance.

PHENOMENA OF THE CARBONIZATION OF COAL.

At the last Meetings of both the Bavarian and the Mid-Rhenish Associations of Gas and Water Engineers, a paper was presented by Herr A. Peters, of Cologne, giving the conclusions arrived at from investigations carried out over a long series of years by the firm of Heinrich Koppers, of Essen, on the phenomena of the carbonization of coal. The paper has been published in the "Journal für Gasbeleuchtung," from which we take the following particulars.

Gas engineers have hitherto held no definite views as to whether a coal should yield a determined quantity of gas. They have rather followed the idea that a greater or smaller yield is to be ascribed to the system of retorts employed. So long as carbonizing retorts which do not achieve perfect working are considered, the latter view is justified, in a sense; but if it is assumed that the coal is distilled in the most suitable manner and the products of distillation are not subjected to superheating, a determined quantity of gas should be obtainable at all times from a particular coal, and this gas should always possess approximately the same calorific value. The quantity of gas, multiplied by the calorific value, should always afford a particular figure which may be taken as the valuation figure of the coal. For dealing in coal for gas-works' use, it is of the utmost importance to know what valuation figure a coal possesses. A number of investigations of coals have been carried out at Essen; and the results are shown in a table, from which the more important figures are reproduced in Table I.

The proportion of oxygen in the coal plays a great part in its distillation. The higher the proportion of oxygen, the lower is the yield of coke and of gas; while the heat requisite for distillation is comparatively great. The retorts, consequently, get colder owing to this greater internal cooling; while the tar becomes thick and rich in carbon, much scurf is deposited in the retorts, and stoppages of the ascension pipes readily occur. The oxygen of the coal reappears, either in the form of water (liquor) or as carbonic oxide or carbonic acid in the gas; while a great part is combined in the tar in oxygenated carbon compounds. It has fallen within the common experience of every gas engineer at some time to have noticed that a coal which yields much liquor needs a long time for carbonization, and gives rise to many disagreeable phenomena. Consequently, a coal rich in oxygen has a smaller value for gas-works' use than one poor in oxygen. From the gas maker's point of view, the oxygen in coal is far more pernicious than the ash; nevertheless, a mere elementary analysis of the coal does not admit of a sound judgment being formed as to its value for distillation. The results of distillation itself must be studied. We are, however, comparatively in the dark as to the influences of the mode of distillation on the results.

Table I.

Coal, Variety No.	1.	2.	3.	4.	5.
Ash, per cent.	4·68	3·32	6·60	2·60	2·70
Coke yield, by Muck's crucible test, per cent.	67·03	67·83	63·60	70·00	66·20
Coke yield, in retort trials, per cent.	69·10	71·40	72·36	78·29	73·44
Tar yield, in retort trials, per cent.	2·38	2·69	2·96	2·13	3·73
Sulphate of ammonia yield, in retort trials, per cent.	1·80	1·97	1·56	1·32	1·48
Carbonic acid yield, in retort trials, per cent.	5·57	2·74	1·54	0·58	0·73
Make of gas per ton of coal:—					
(1) Inclusive of CO_2 and H_2S; cubic feet (at 60° Fahr. and 30 in.) per ton	11,001	9,868	11,403	11,334	11,700
(2) Exclusive of CO_2 and H_2S; cubic feet (at 60° Fahr. and 30 in.) per ton	10,477	9,386	11,030	11,166	11,431
Calorific power of gas, B.Th.U's per cubic foot, net	481	499	546	555	557
Calorific power of gas from 1 lb. of coal, B.Th.U's net	2,135	2,079	2,690	2,775	2,844
Composition of gas, volumes per cent.:—					
Nitrogen	1·83	2·87	2·41	5·88	8·56
Hydrogen	60·09	57·18	55·08	52·24	47·75
Methane	22·28	24·05	29·58	32·18	33·19
Heavy hydrocarbons	2·65	3·30	4·00	4·20	4·40
Carbonic oxide	13·15	12·60	8·93	5·50	6·10
Specific gravity of gas	..	..	0·49	0·45	0·56

Some information may, however, be gleaned from the work of coke-ovens. Such ovens arranged for the recovery of bye-products have walls about 33 feet by 7 feet in area, which are heated as uniformly as possible. When the coal is introduced into the ovens, carbonization of the surface occurs, and a fused dense layer about 1½ inches thick results. This layer consists of coal undergoing decomposition, heated on the one side by the oven and cooled on the other by the cold adjacent coal. The tar resulting from the decomposition condenses on the cool side, and is re-distilled as the heating extends inwards. The coal in the interior of the charge remains completely unchanged until the layer undergoing distillation has advanced to the middle. It has recently been held in regard to vertical retorts that the products of distillation find their exit through the bed of coal. The presumption that the products of distillation in such retorts escape through the cool core seems to be based on an expression of Hilgenstock, in a lecture which he delivered in 1902 (see the "Journal," Vol. LXXX., p. 1145); but this appears to have been due to some misunderstanding of what he said.

After charging, samples may be taken from the core containing a greatly increased proportion of water. Condensation of the moisture from the coal and of chemically formed water occurs so long as the core of the charge remains cool—that is to say, until it has reached a temperature of 100° C. It does not attain this temperature until it is about to be gasified. In coke-ovens in which the charge is worked off in 30 hours, the temperature does not ordinarily reach 100° until 15 hours have elapsed. The first stage in the distillation is the evaporation of moisture from the outer layers; the rest of the moisture is not interfered with, and serves to condense the primary tar products. In the coking of many varieties of coal, it is absolutely essential that the coal should be used in a damp state, in order that the water may act as a cooling medium for the condensation of the tar which serves to bind the particles of coal. A damp or cool core to the charge causes the yield of tar to be smaller, but the yield of coke and of gas to be increased. The tar, however, is better and more fluid. The yield of coke from a given coal varies according to the method of distillation, and the mass of the charge. The extreme cases are a gas-retort charged with a thin layer of coal, on the one hand, and a large oven with a charge of 8 to 10 tons of coal. The course of carbonization in these two extreme cases should be studied.

Assuming that in both instances the same coal is used, the residual coke in the retort will be relatively small in amount; while a considerable quantity of comparatively bad and thick tar will be formed. There will be much scurf and blocked ascension pipes. The quantity and quality of the gas will be pretty well the same as in the large oven; but in the latter there will be a greater yield of coke, which will be of better quality, and less and comparatively thin tar. There will be no scurf and no stopped ascension pipes. The quantity of gas will be the maximum attainable. The chief difference in the distillation in the two cases is that in the retort the coal core which condenses the tar vapours produced in the first instance is practically lacking. Consequently, there is virtually no condensation of the tar, which therefore passes on with the gas and undergoes decomposition on the walls of the

superheated pipes. It is decomposed partly into solid products rich in carbon—such as scurf, soot, or thick tar—and partly into gas poor in carbon, which mixes with the gas directly evolved from the coal. The superheating space in the retorts is absolutely necessary for the gasification of coal in small quantities, as it provides for the decomposition of the tar vapours. Both the space above the coal and the high temperature are requisite to ensure a good yield of gas.

The partial decomposition of ammonia into its elements, and its partial conversion into cyanogen, cannot be avoided in this method of distillation. In the large coke-oven or vertical retort, however, the heated walls are lined with coal so that their heat is utilized for the purpose of distillation. The superheating of the resultant gases on their way to the ascension pipe is intentionally avoided, as it has been practically demonstrated that such superheating causes loss. The products of distillation which in the retort are decomposed by the incandescent walls are condensed by the cool core in the oven, and are subsequently distilled by the heat, with the result that the amount of coke and ammonia produced is increased, a thinly fluid tar is formed, and the formation of scurf and of stoppages in the ascension pipes are inhibited. Provided the walls of the oven are uniformly heated, and are lined or covered by the coal, there is no possibility of the products of distillation being decomposed as they escape; but if the walls are not uniformly heated, or if the coal does not entirely cover them, the quality of the gas and of the tar deteriorates, and the yield of ammonia falls off. The structure of the coke depends on the intensity of the heat at which it is produced. The products of distillation travel in the opposite direction to the flow of heat, and pass between the coke and the walls to the outlet of the oven. Hence so long as there is coal present in the middle of the charge, the temperature in the oven is relatively low, and the gas escapes without undergoing decomposition.

The course of carbonization in inclined retorts which might be filled with coal partly follows both of the two extreme cases just considered. Tar is condensed within the layer of coal, is again distilled, and undergoes decomposition on the incandescent walls, because above the layer of coal there is a large surface of highly-heated retort with which the gas is brought in contact. With inclined carbonizing ovens, properly heated, carbonization occurs as in horizontal coke-ovens. In both the inclined and the horizontal oven, as well as in the vertical retort, the gas evolved rises vertically and collects in the space above the charge. This space is naturally not heated, and the gas passes away from it without decomposition. The vertical depth of the charge is, however, less in coke-ovens than in special vertical gas-retorts. In the former, the upper and lower parts of the coal are gasified nearly simultaneously. In a vertical retort (say) 4 metres (about 13 feet) high, the carbonization must advance from below upwards; so that it is completed at the bottom before it is finished at the top. That these views are correct is shown by the working of a type of oven which was designed with a view to obtaining a high yield of ammonia. Two ovens were placed one on each side of a vertical shaft, with which they communicated by horizontal passages. The shaft was connected with the gas-outlet leading to the hydraulic main. The horizontal passages were intended to convey away the gas from the coal immediately on its evolution, and so avoid superheating. The retorts were only heated on the side farthest away from the exit shaft. In working, this oven proved to prolong considerably the time required for carbonization, and the gas passed alongside the heated walls and across the top of the charge to the uppermost horizontal passages, through which it escaped to the exit shaft. It was proved that the gas did not pass out through the block of coal to the other horizontal passages. This costly trial oven was given up.

The impermeability of the charge of coal, and the formation of a seam of tar, were demonstrated by Hilgenstock in 1902. Using wet coal, he showed that the portions farthest removed from the walls were gasified last, and that if a charge was drawn before the expiration of the full carbonizing period, samples taken from different positions showed a decrease in the amount of true coke and an increase in the volatile matter, or gas and ammonia, on passing from the outside to the middle of the charge. [*Vide* table in "JOURNAL," Vol. LXXX. p. 1146.] Schniewind has supplemented these results by others obtained with charges of dry coal, and finds that carbonization is more rapid with it. For instance, the portions of the coal most remote from the walls begin to give off gas between the tenth and eleventh hours; whereas with the wet coal gasification in the same position did not start until some 15 hours after charging. Hence it may be seen that a shorter time for carbonizing is required in ovens intended for gas-works' use than in coke-works, owing to the coal being carbonized dry. Ovens or carbonizing chambers for gas-works consequently have a greater productive capacity. The question, however, arises, What is the time for stopping the distillation in order to secure a proper yield of good gas? It does not appear necessary that the core of the block of coke should have all its gas expelled from it, as it must in coke-oven practice.

Such experiments have been carried out by the firm of H. Koppers with Mont Cenis (Westphalian) gas coal; and the results obtained are shown in Table II. The coal contained 6 per cent. of ash, and by the crucible test yielded 63·6 per cent. of coke. The products of distillation were examined when carbonization was carried out in four different conditions. Firstly, the coal was distilled so that the products of distillation could neither condense nor be decomposed; and in these conditions the yield of coke was

TABLE II.

Conditions of Carbonization.	No Condensation or Decomposition of Products. 1650 — 1750° Fahr.	Tar Previously formed Decomposed by Hot Surfaces. 1650°—1750° Fahr.	Normal Conditions. 1650°—1750° Fahr.		Low Temperature (Coalite?) 930°—1020° Fahr.
			1	2	
Yield of coke, per cent. . .	65·98	68·28	72·36	75 55	75·45
Yield of sulphate of ammonia, per cent.	1·45	1·47	1·40	1·45	0·31
Yield of tar, per cent. . . .	10·73	8·30	2 96	0·67	11·75
Yield of carbonic acid, per cent.	1·35	1·91	1·54	1·62	0·70
Make per ton of coal, cubic feet at 60° Fahr. & 30 in.—					
Inclusive of CO_2 and H_2S .	7539	9699	11403	11615	2342
Exclusive of CO_2 and H_2S .	7022	9269	11030	11199	2139
Specific gravity of gas . . .	0·66	0·51	0·49	0·42	0·90
Calorific power of gas, B.Th.U. per cubic foot, net. . . .	590	507	546	543	748
Composition of gas, volumes per cent.—					
Nitrogen	7·14	4·30	2·41	3·41	..
Hydrogen	40·07	56·60	55·08	53·79	28·02
Methane	42·28	25·90	29·58	30 00	61 68
Heavy hydrocarbons. . .	2·10	3·40	4·00	3·80	2·77
Carbonic oxide	8·40	9·80	8·93	9·00	7·35

lowest, there was much tar, and but little gas. Secondly, when the gas of the preceding distillation was decomposed by leading it over heated surfaces, the tar was decomposed to an extent depending on the time, the surface, and the intensity of the heat. Gas and solid constituents here resulted from the decomposition. Thirdly, when the coal was distilled in the normal manner the yield of gas and tar was normal, as in working on the large scale. Fourthly, when the coal was heated throughout uniformly at a lower temperature there was a high yield of tar, and but little gas and ammonia. The product was "Coalite," which has been so much talked of lately in England.

No good purpose is served by charging with coal broken to different sizes, but rather the coal must be encouraged to lie as closely as possible by using such a proportion of fine and coarse that all hollow spaces will be filled. Having regard to the way in which the products of distillation escape, it is evident that the vertical retorts must not be made too high. A height of 13 feet is more than enough. Further, continuous distillation, which is aimed at in England, has no prospect of affording good results. For rational distillation a large surface of walls is required, and the charge must be distributed so that there is a maximum wall surface exposed to it. The quantity of heat which can be transmitted through such walls, according to observations made in coke-works, amounts to about 5500 calories per square metre (2027 B.Th.U. per square foot) per hour. The heat required for distillation varies according to the composition and dampness of the coal, but averages about 700 calories per kilo. (1260 B.Th.U. per lb.). The walls on the furnace side have a temperature of from 1050° to 1200° C., and 7 to 8 kilogrammes of coal are distilled and 210 to 240 litres of gas produced per square metre of wall surface (1·4 to 1·6 lbs. of coal and 0·69 to 0·79 cubic foot of gas per square foot). For a large make of gas large heated surfaces are requisite; and the charge of coal must be at rest. From this point of view alone the attempts at continuous distillation must be condemned.

The walls of the carbonizing chamber must be heated uniformly, and so that the products of distillation are not superheated on their way to the exits. These products must always travel upwards, and, consequently, must be taken off from above the top of the charge. By uniform heating is signified the same heat in the various horizontal layers of an elongated carbonizing chamber. When lean coals have to be coked, the discharging end of the oven has to be made considerably wider than the charging end; and as coking of a charge must be completed at the same time at both ends, the temperature must be greater in the heating passages at the wide end. Taking a vertical section through the heating chamber, the temperatures must decrease upwards. The best results of all can be attained only by heating in this manner. Want of uniformity of heating longitudinally, or a wrong fall, or a rise, of temperature, from the base upwards results in considerable loss. The greatest importance must be attached to correct heating of the oven. Heating from the bottom upwards has been general in coke-oven works for many years; and the penalty paid for deviations from the practice has been heavy. But too little value is still attached to uniformity of heating. The gains of coke-oven works have been so great that less perfect ovens have given satisfaction. In many places, however, systems have been introduced which avoid the faults of the older types of ovens. Among the improved ovens may be mentioned the Koppers, in which provision is made for the distribution of the gas and air to every heating passage, for regulating the draught of each vertical flue, for ready access, and for heating exclusively from below upwards. This type, according to the author, affords the advantages of a maximum yield of gas, a small yield of good tar, recovery of the whole of the ammonia liberated, low consumption of fuel, little tax on the refractory structure and, consequently, low repairing charges, and simplicity of service and precision of control.

PERSONAL.

Mr. CYRIL TOWERS, late Assistant Manager at the Romford Gas-Works, has, out of over forty applicants, been appointed Works Manager to the Brentwood Gas Company.

Mr. JAMES BELL, Assistant Gas Manager at Airdrie, has been appointed Manager of the Kirkintilloch Corporation Gas-Works. Mr. Bell has all along been a pupil of Mr. D. Vass, of Airdrie. He was President of the Scottish Junior Gas Association (Western District) in 1905 6.

It is with much pleasure that we have received an indication of Mr. G. F. L. FOULGER's satisfactory recovery. A card to hand yesterday from Mr. and Mrs. Foulger and family thanks their friends for "the kind inquiries which have been made, and for the sympathy shown during Mr. Foulger's recent illness."

Mr. WILLIAM TAYLOR, J.P., who has for the past forty years been Manager of the Forres Gas Company, Limited, has been unanimously appointed to the position of Managing-Director of the Company—an honour which is felt to be exceedingly gratifying, not only by the shareholders but also by the community.

Mr. WILLIAM E. F. POWNEY has been appointed Technical Assistant in the second class in the Chemical and Gas-Testing Department of the London County Council, at a commencing salary of £150 per annum. There were 30 applicants for the position, in response to the invitation which appeared in the "JOURNAL" for the 24th ult. Mr. Powney, who had been a relieving Gas Examiner at Spring Gardens, is an Associate of the Institute of Chemistry and a Fellow of the Chemical Society.

Mr. and Mrs. MAURICE GRAHAM have just completed their tour round the world, which they began on the 19th of October last year. They reached Liverpool on the morning of Thursday, the 3rd inst., on board the Cunard liner the s.s. *Lusitania*, which had the misfortune to be delayed by fog in starting, and also to be fogbound for more than 24 hours in the Mersey. We are pleased to know that Mr. Graham is in the best of health after his journeyings and his experiences in so many different countries and climates. The further articles which he is contributing to our columns will describe his visit to San Francisco, his lengthy stay in Vancouver, British Columbia, a unique trip to Klondike and the Far North, and a run across Canada and through some gas-works in that Dominion up to Quebec and thence to New York. When completed, it is intended to publish all the articles on "Round the World—And Some Gas-Works" in book form, with many additions to the already numerous and attractive photographs, more detailed facts and figures, besides matter of more general interest than could well be found space for in the "JOURNAL." It is believed that such a book will be of considerable interest and value to many gas readers as a permanent record of visits to gas-works in different parts of the world, and as embodying the characteristic views and the energetic labours of a Civil and Gas Engineer. To Mr. Graham his journey has been an educative experience of a large and unique order; and he speaks with unqualified pleasure of the reception he met with at the hands of gas engineers in all the cities and towns he visited.

As is stated by our Scotch Correspondent in his "Notes" to-day, Mr. WALTER GRAFTON, of the Beckton works of the Gaslight and Coke Company, has been appointed Assistant-Manager under Mr. Alexander Wilson at Glasgow, at a salary of £350 a year. Many were the congratulations and good wishes pressed upon him last Saturday afternoon, when the members of the London and Southern District Junior Gas Association (with which he has been closely identified since its inception, mainly owing to his instrumentality, some six years ago) met at the Old Kent Road Gas-Works. But these were freely mingled with expressions of regret that his new appointment would take him so far away from his old friends. Mr. Grafton was trained by the late Mr. John Methven at the Nine Elms Gas-Works; and he was subsequently appointed to Beckton, where he has served during the past eighteen years on the engineering staff. He has done much good work with regard to the question of the standard of light, and has lately designed the "Parliamentary" and "Ideal" argand burners—the one a 15-hole with a 7-inch chimney, and the other a 24-hole with a 6-inch chimney. His name will be remembered in connection with our "Register of Patents," the inventions protected including burners and means for removing naphthalene from illuminating gas; and he is also well known as a contributor of papers to the Technical Press, and the Gas Institute and Institution—the President's premier prize of a silver medal and £10 having been awarded to him for the paper that he read before the Institute in 1901 on "The Effect of Quality and Pressure of Gas on the Efficiency of Incandescent Gas Lighting, having Regard to Economy." Mr. Grafton has also, of course, for some years been well known as a lecturer on "Gas Manufacture and Supply" at the Regent Street Polytechnic; his classes there having proved eminently successful, as is shown by the fact that his students have gained 23 medals, £26 in prizes, and nine London County Council scholarships tenable for three years. On vacating the position of President of the London Junior Association (which he held for several years), he received a striking manifestation of the esteem in which he is held by the members, who made him a handsome presentation. Mr. Grafton is the author of a book on "Practical Gas-Fitting, including Supply Data."

SOME MODERN COMPETITORS OF SULPHATE OF AMMONIA.

IN the "JOURNAL" for the 10th ult. (p. 414), we gave an abstract of a paper, entitled "Chemical Industry in Relation to Agriculture," prepared by Professor Adolf Frank, Ph.D., for the London Section of the Society of Chemical Industry, with some notes of the discussion thereon. The full text of the paper is published in the current number of the "Journal" of the Society, and we extract the portions specially referring to sulphate of ammonia, nitrate of soda, and the utilization of peat; appending thereto the remarks made by Mr. A. H. Lymn, in view of his letter, and the editorial note to it, which appeared last week.

The two important sources hitherto available for supplying the farmer with nitrogenous substances were ammonium sulphate, obtained as a bye-product from coal on coking it or making gas from it, and the sodium nitrate deposits occurring on the high plateau of Chili. The production of ammonium sulphate from gas liquor was commenced in Great Britain about 1850, and amounted to 9700 tons in 1860. Later on, ammonia was also obtained as a bye-product in the dry distillation of shale, the recovery of waste gases from blast-furnaces, coke-ovens, and gas-generators, so that the British production rose to 293,000 tons in 1906. Germany takes the second place among the countries producing ammonium sulphate; its output—mostly from coke-ovens—having been 235,000 tons in 1906. All the other industrial countries together produced only 19,000 tons. Though the successful process of Mond, by which power gas and ammonia are obtained simultaneously, is securing a steady increase in the production of sulphate, it must not be overlooked that ammonia is in every case but a bye-product of other manufactures. Hence, unfavourable business conjunctures, such as occurred last year, must bring about a decrease in the production of ammonia; so that agriculture cannot depend with certainty upon obtaining a sufficient supply.

As the demand for nitrogenous manures increased more rapidly than the production of ammonium salts, assistance was sought in the extensive deposits of nitrate of soda. Though these had been opened up on the West Coast of South America, on the high plateau of Chili, as far back as 1830, the nitrate had, up to 1860, been used for chemical purposes only. The export of nitrate of soda from Chili was 68,000 tons in 1860; it rose to 1,023,000 tons in 1890, and to 1,600,000 tons in 1906. Of this latter quantity, about 1,200,000 tons came to Europe; 20 per cent. of it being used in industry for the production of chemical products, explosives, &c., while the remainder was absorbed by agriculture. Germany, on account of its climate, as well as of its extensive cultivation of beetroot, uses the largest quantity of Chili saltpetre. In 1906, Germany imported about 590,000 tons. Next comes France; while the consumption of British agriculture is but small. The demand for saltpetre in the United States is rapidly increasing; the import figure having risen from 177,000 tons in 1901 to 364,000 tons in 1906.

The price of Chili saltpetre, which stood at £7 to £8 per ton in Europe at the beginning of the present century, has been raised to £10 per ton, not only on account of the higher cost of production, but also in consequence of the formation of a syndicate of producers. European industry and agriculture have, therefore, to pay about £12,000,000 a year for their present import of nitrate of soda. Since the cost of Chili saltpetre serves as a standard by which the price of the various other nitrogenous manures is regulated, ammonium salts have also risen in value at a corresponding rate—viz., from £10 to £12 10s. per ton. This tribute, heavy and steadily increasing with the growing requirements, and mainly borne by agriculture, was indeed felt as an oppressive burden. Yet over and above there had to be faced the danger that the Chili deposits might be advancing towards exhaustion, just as was the case with the Peruvian guano deposits. Though the opinions given by experts on the available stock of Chili saltpetre vary widely, the exhaustion of the supply of saltpetre, whether it occur in thirty or in fifty years, must be reckoned with, apart from the fact that the increase in price is already beginning to prove burdensome. The probability that other saltpetre deposits may be discovered is slight, because the special climatic and geological conditions which combined to build up the large masses of saltpetre in Chili, are hardly met with elsewhere.

In the presence of these facts, it is easy to understand why one of our greatest authorities, Sir William Crookes, has sounded a warning note just as Liebig did in his time, as to the danger threatening the whole human race through the want of nitrogenous manure—that indispensable agent in the fertilization of the soil. As far back as 1897, Sir William Crookes showed that the food—as measured by the consumption of wheat—which will be required by mankind at the present rate of increase in thirty to forty years, can only be produced if the fertility of the soil is correspondingly improved. For this purpose, more abundant manuring with nitrogenous substances is necessary.

The thought that Germany—the largest consumer of nitrogenous manure—would have to import it as she is now importing Chili saltpetre, acted as a strong stimulus to discover hitherto unused sources of power. The solution of this problem, so important in many respects from the economic standpoint, has now

been found, by utilizing the large stores of energy accumulated in the German bog areas. About the middle of the sixties, I paid attention to the investigation of those districts, while endeavouring to introduce there potash manures, and while interested in a plant for the utilization of meadow-ore (bog-iron ore) which was being raised there. At that time I fully recognized the difficulties which had to be overcome to utilize successfully those extensive deposits of peat. When, in the nineties, the improvement in the construction of electric generators offered the possibility of easy transport of the energy produced, and since large quantities of energy are required for the production of nitrogen, I resumed my former studies.

As I knew from my own experience, and as I had also learned from the failure of others, that the physical properties of peat, especially its large proportion of water, made it absolutely impossible to convert the material into a fuel easy of transport and fit to compete with coal, I recommended the erection of large electric power stations in the middle of the bog district, so as to utilize the heating power of the peat for the production of steam with the least possible expenditure of labour. The improvement of the gas-engine and the work of Mond on the simultaneous production of power gas and ammonium salts in the gas-generator helped to mature further plans. If it was possible to gasify in a generator the raw peat, first dried to a certain extent, and to obtain thereby not only power gas, but also to extract at the same time, in the shape of ammonium salts, a large portion of the frequently high percentage of nitrogen contained in the peat, then the problem of cheap production of power was solved.

Experiments which my collaborator, Dr. Caro, made with the assistance of Dr. Mond, at the works of the Power Gas Corporation at Stockton and Winnington, and, later on, at the works of the Deutsche Mondgas Gesellschaft in Westphalia, furnished the very favourable result that peat containing from 50 to 55 per cent. of water could be gasified without difficulty. It was found that in addition to a power gas, yielding 1400 kilogramme-calories per cubic metre, a quantity of ammonium sulphate was obtained which corresponded to 75 to 80 per cent. of the nitrogen originally contained in the peat. At a lengthy trial carried out last May at the works of the German Mond Gas Company at Sodingen in Westphalia, when 40 tons of wet peat were worked up per day, 2 tons of peat containing 50 per cent. of water furnished 2400 cubic metres of power gas and 38 kilos. of ammonium sulphate. As the nitrogen content of the dry peat amounted to 1·05 per cent., this yield of ammonia represents about 75 per cent. of the total nitrogen. On using the power gas in a large Deutz gas-engine, the consumption per horse-power-hour was 2·4 cubic metres. Hence, not taking into account the production of steam required for working the generator, the above 2400 cubic metres of power gas are capable of supplying 1000-H.P.-hours.

As Germany owns an area of 22,000 square kilometres (8500 English square miles) of bogs, she can produce not only the nitrogenous manure required for her agricultural requirements, but can, in addition, supply large quantities of power for other industrial and agricultural purposes, as, for instance, for railway and canal traffic; while the land from which the peat has been removed is suitable for cultivation, as long experience in Holland has demonstrated. Similar conditions obtain in Great Britain, especially in the Irish bogs. Ireland, for her area, owns more peat deposits than any other country in the whole world. Almost one-seventh of her surface—viz., 4250 square miles—is covered with peat deposits of a quality rarely found elsewhere in Europe; and the percentage of nitrogen in the peat is often very considerable. The zealous endeavours made for years to improve Irish agriculture and industry can therefore be assisted to a great extent by the rational utilization of the bogs.

The author devoted the concluding portion of his paper to particulars of various products which are now being obtained industrially from calcium cyanamide.

The following is the "official report" of Mr. Lymn's remarks on the paper: There was one process which had been touched upon in which England was undoubtedly pre-eminent—viz., the recovery of nitrogen in the shape of sulphate of ammonia from coal and combustible matters generally. It was well known that Dr. Mond, fifteen years ago, was recovering sulphate of ammonia from coal at the rate of 80 lbs. of sulphate per ton. This had gradually developed, and the latest phase in the utilization of the Mond process was that of recovering ammonia from peat. In this connection, he should like to correct an evident misapprehension in the paper—viz., that it was Dr. Caro who, with Dr. Mond, worked out the Mond process in its application to peat. It was true that Dr. Caro gave assistance in the working-out of that process as applied to the utilization of waste colliery products, and also of a certain material from Germany called "Seeschlick" (lake slime), which contained a large amount of nitrogen and which was very successfully treated. But as regards peat, he wished to make it clear that, a year or two before either Dr. Mond or he met Dr. Caro, peat was already being gasified by the Power Gas Corporation of London, and as a fact by himself, under ammonia-recovery conditions, at Stockton-on-Tees in 1903. It was this Company who had built and supervised the operation of the plant in Germany whereof the results had been stated by Professor Frank; indeed, two further plants to gasify peat were now being built by this Company, one of them for a new electricity supply station in Italy. At the same time, he must draw attention to the eminently valuable work of Professor Frank and Dr. Caro in Germany, in recognizing the Mond process as the best adapted for making use of the peat bogs which cover so large an area there. It was probably not generally known that in many places there were peat bogs, at all events in this country and in Ireland, so rich in nitrogen that they could be profitably gasified, for ammonia only; the gas being looked upon as a bye-product which, for lack of power users, might in some cases have to be treated as a waste product. The sulphate of ammonia obtainable from a ton of theoretically dry peat varied naturally according to the nitrogen; but in his experience it ranged from 80 lbs. to 160 lbs. This showed the enormous total value of the peat in the United Kingdom as a source of nitrogenous fertilizers. Peat could be produced in a suitable condition for gas-producers at a cost of from 2s. 6d. to 3s. 6d. per theoretically dry ton. Of course, the "theoretically dry" ton was simply mentioned as a standard; it naturally contained in its air-dried condition from 25 to 30 per cent. of moisture. The conditions he had just mentioned might also apply to waste small coal; a very large plant being now under construction in the Midlands to gasify this fuel for ammonia only, the gas being temporarily a bye-product.

PARKINSON COMPANY'S NEW SHOW-ROOMS.

As was briefly announced in last Tuesday's "JOURNAL," the Parkinson Stove Company, Limited, have just opened new London offices and show-rooms at No. 129, High Holborn, W.C. the old premises at Finsbury Pavement being closed. This bald statement, however, is by no means a sufficient reference to the matter; for both the rooms and their contents are deserving of favourable notice. Handsomely fitted up with oak panelling and comfortable offices, the show-rooms consist of lofty ground-floor and basement accommodation in one of London's main traffic arteries. Situated close to Kingsway, they are, besides being actually in a busy thoroughfare, easily accessible from every part of the Metropolis. Already there is sufficient in the window to draw the attention of the crowds of passers-by; and when the Gaslight and Coke Company have completed the installation of modern gas lighting appliances which they are going to put up, the place cannot fail to prove an excellent advertisement for gas in general, as well as for the Parkinson Stove Company in particular.

So much for the outside. Having crossed the threshold, one is confronted with specimens of the latest appliances for the utilization of gas for heating and cooking. There are gas-steam radiators of all sizes; one in action being of plain design, with no projections to catch the dust. Several fires fitted with tiled recesses and handsome overmantels, show how extremely attractive they can be rendered when used with the most appropriate accessories. Many of the well-known patterns of fire are fitted with a single row of block fuel; others with the firm's new "intense" pillar fuel, which has already been noticed in our pages. The special feature of the pillar fuel is that the points project inwards to meet the flame which passes freely up the centre, by which means greater heating value is secured from the gas consumed. In the fires—the "Onyx" and the "Beryl"—provided with this new fuel, it has, of course (the pillars being in one piece), been possible to dispense with nearly all the ironwork that otherwise has to be used to keep the balls or blocks in position; the pillars being simply held in place by a thin band of iron, formed into an oval, which is fixed in front of the fire. In this way, there is nothing to prevent the full heat from the fuel passing straight into the room, which is a consideration from an economical point of view. In addition the pillars are made of a highly refractory material, which can quickly be brought to incandescence. Another pattern of fire which attracts notice is the "Crown No. 4," fitted with a duplex burner. This can be seen in action in the show-rooms. There are twelve bunsens—the six centre ones being controlled by one tap, and the three on either side by another.

As to cookers, these are to be seen of all sorts and sizes—from the smallest type for slot installations to the huge ovens which are designed for hotels and restaurants. A popular pattern is the "Intermediate" grade cooker, which is a somewhat cheaper style than the well-known "Crown" form, and is found suitable for gas companies to let out on hire. One of the features of these cookers is that they are fitted with a very large hot plate. Among the numerous forms of griller, is a new one, with a top which lifts up and gives facilities for cleaning, &c., and (in the larger sizes) with a boiling-burner at the side. This is another appliance which is extensively used by gas undertakings in connection with prepayment supplies. A washing-boiler is on view that has the appearance of being specially adapted to withstand the effects of hard wear, and withal is moderate in price. The inside is copper tinned; and there is no seam in the bottom. Outside there is a galvanized iron body; and the heat travels up through the space that is left between this outside body and the boiler proper. There is also a damper, by way of which the steam can pass into the chimney.

As is almost unnecessary to mention, the Company are making a speciality of the water-heating side of the business; and a big show is made of the Maughan patent geysers, and other appliances designed for a similar purpose. In connection with the domestic uses of gas, water heating is a matter that is more and more claiming attention; and we are informed by Mr. T. E. Barralet,

the London Manager to the Parkinson Stove Company, that the hire-purchase of geysers is, from his experience, proving satisfactory alike to consumers and gas suppliers. Space does not admit of notice of all the types of water-heaters that can be inspected here; but one or two may be shortly touched upon. The "Simplice" form is provided with inter-locking gas and water taps, which, by preventing the gas from being turned on without water flowing in, make it impossible to damage the apparatus through carelessness. In the "Multi-Supply," a pilot-light is always on; and when hot water is drawn off, the entrance of cold water to replace it opens the gas-valve, and the gas at once lights up. One of these, it may be remarked, has been supplied to the King. On the tap being closed, the geyser is automatically put out of action. With this apparatus, hot water can be obtained at any time all over a house. The "New Teba" has a safety gas-valve, which prevents bursting or damage through failure of the water supply. The gas cannot be alight unless cold water is actually running into the geyser; as soon as it stops, from whatever cause, the gas is automatically shut down. The water is heated in copper chambers, and is not exposed in any way to the gas products; and it is so constructed as to give the greatest possible efficiency from the gas. The gas traverses the interior three times before it escapes, so that practically all the heat in it is used. Actual tests, it is said, have shown that 97 per cent. of the gross value of the gas has been utilized. Finally, there is the firm's newest system of supplying hot water—the "Gacylote." This is a specially-constructed boiler, which holds a definite quantity of water (from 5 gallons upwards) heated from a small gas-burner. The gas supply is controlled by a simple valve, which lowers the flames when the water reaches a desired temperature, and raises them if the temperature is reduced. Thus it maintains a store of hot water which may be drawn from any tap. As hot water is drawn off, and fresh water comes in, the gas is automatically raised to heat it. There is an air jacket between the outer cover and the boiler which retains the heat; the gas required to maintain the heat in a 15-gallon apparatus being stated to be only 2½ to 3 cubic feet per hour. Mr. Barralet speaks in enthusiastic terms of the "Gacylote," which he considers has a very big future before it, because it does not require manipulation, can supply hot water to any part of a house, and is economical on account of the fact that there is no loss of heat in radiation. The "Gacylote" is made in two patterns—the "H" for supplying water under pressure, and therefore either above or below the boiler; and the "O," for supplying it without pressure, and thus only below the level of the apparatus.

FRESH LIGHT ON CO-PARTNERSHIP.

By the Right Hon. A. J. Balfour, M.P.

[**Points from the Presidential Address to the Labour Co-Partnership Association, see p. 707.**]

I need hardly say it is a source of great gratification to me, in this my year of office as President of the Association, that I should have an opportunity of addressing so important and so representative a meeting upon the great objects which the Association is designed to promote. In truth, the magnitude and importance of these objects it is not easy to exaggerate, because we touch the very central problem of social economics. Social economics, the organization of the productive forces of the community, have been in controversy now for some generations. I welcome controversy and believe in discussion; but I have reluctantly to admit that much of what has been said on this all-important theme is not likely to conduce in the end to any remodelling or development of the economic framework of society in any direction which is likely to improve the general lot of mankind. That criticism, if it be in some respects well-founded, the work of this Association at all events need not fear. Whatever else may be said of us, it is undoubtedly true that we are a practical body. We do not, indeed, repudiate reflection and speculation upon these great matters. We believe that such reflection and speculation are of enormous value; but we can point to the fact that we have passed beyond speculation in the sense that our theories have been carried out in practice, and have not been found wanting.

Co-Partnership Practically Proved.

Where they have been tried under favourable circumstances, where they have been tried under the guise of wise, public-spirited, and, let me add, businesslike persons, those experiments have been a success; and nobody can survey the field, and see what has been accomplished in France, in this country, and elsewhere, and truly say that industrial co-partnership is still an untried experiment—a plan which looks well upon paper, a method of dealing with industrial problems which may commend itself to the theorist, but which the practical man repudiates. That is not so. And we can point to the actual facts of contemporary history to prove that the general scheme that we advocate is one which, if tried in the proper manner and by the proper people, can produce all those happy results which its sanguine originators hoped from it. May I say at the very beginning of such observations as I have to address to you that we are advocates of no hard-and-fast scheme to which every industrial organization must fit itself or else be outside the purview of our operations. That is not so. We recognize that the industrial system of modern society is an extraordinarily complex whole, having its roots deep in an immemorial past, bound, therefore, by all the ties which hamper the present in its relation to the future because of the past, and we also recognize that different industries, co-related as they necessarily are, yet carried on under different conditions, may require different organizations, having to deal with persons of different degrees of knowledge, experience, and culture; and that it is quite impossible, it would be the worst form of doctrinarianism, to lay down some absolute rule of industrial organization to which every industry must conform or be regarded as utterly wanting in those qualities which bring it within the favourable view of those who rule this Association.

All Schemes Leading to Co-Partnership Welcome.

It is true that our ideal is complete co-partnership, and by "complete co-partnership" I mean that those who carry on the work shall be associated as partners in all that the work brings in its train. This, broadly speaking, is the way I should roughly define what is meant by co-partnership. But we recognize as an approach to that ideal any arrangements which are far less complete or less theoretically perfect. We applaud every arrangement which softens or obliterates the divisions between employer and employed, between owner and occupant. Everything that is a step in this direction is to us welcome, everything which helps along the road I have indicated is a step we desire to encourage; and, if I may speak for myself, I am certainly not one of those who believe that the ideal scheme can necessarily be carried out with advantage in every industry, in every department of productive effort. It certainly cannot be carried out in the present development of society; and I am too disinclined to prophesy, or to lay down the proposition, that the time will ever come, or, indeed, ought to come, in which the whole industrial effort of the world will be formed on one single ideal model of the kind I have described.

Individual and Efficient Management.

There are many persons, however, who think that this ideal is impossible simply because, as they hold, you cannot introduce what in the cant phrase of the day is described as the democratic constitution into the management of purely business affairs. If the critics of whom I speak mean by that that you cannot carry on a difficult business requiring initiative, courage, risks to be taken, instant adaptation of means to ends by a committee, however constituted, I entirely agree with them. The result of my own personal observation upon the way the business of the world is carried on is that the really good work of an original kind is always carried on by an individual. But that does not mean by an uncontrolled individual; nor does it mean an individual without associates. What it does mean is a committee, whether it is a council of war in matters military, whether it is a board of any kind or description, on which every member is not only theoretically and in the eye of the law, so to speak, equal, but actually takes upon himself an equal share in the operations carried on by the committee, that is predestined to barrenness if the work is in any degree one of complexity or difficulty. And from my experience, the abler the committee the more inefficient it will be. It must be one man who does the work, not the committee. The distinction is all-important in practical life. I think there are great departments of our public life and academic life where this is not sufficiently considered, and where the result is that there is an enormous waste of brains, time, and, let me add, temper, with a perfectly amazing, indifferent output of efficient work simply due to the fact that people do not understand that it must be a well-selected individual who does the thing, however you may control him, however you may advise him, whatever precautions you may think fit to take to see that he does not betray or misuse the powers given to him, and that he is really working for the common end of the association to which he belongs. This is my view of the way of conducting the business of the world. If I thought the introduction of the co-partnership system was to prevent the initiative which depends on men, and to transfer that initiative to the incompetent hands of a committee, however able, I should despair of the process. But it does not mean that at all.

Co-Partnership Particularly Suitable for Stable Industries.

I believe that the workmen of this country are as capable as any other class of the community in understanding the real force of the observations I have ventured to make as to organization of industry in general. They know perfectly well, or they will know, when this system gets into force for any length of time that—if you are, in these days not merely of competition, but in these days when industrial and scientific inventions are making such rapid changes in almost every industry in the country, to hold your own in the struggle for existence against competitors who have every advantage of organization and initiative—they cannot afford to give up the advantage which efficient, able management, and that alone, can give them in the struggle for commercial existence. So far as I am able to form a judgment, the plans the Association advocate can most efficiently be carried out, in the first instance at all events, in those well-established industries which have about them but little of the speculative element, but little risk, and in which the changes in invention are not so bewilderingly rapid as to make an entire remodelling of plant and other appliances a matter of almost year by year occurrence. I do not say that co-partnership is not applicable to all kinds of

industry. All I say is that, in the first instance, it will probably be more effectively applied to the more—how shall I put it?—established, the less risky forms of industry, of which there are a great many in the country.

An Appreciation of Sir George Livesey.

There is some evidence of that in the way in which the system of co-partnership is spreading among gas companies. You all know that perhaps the greatest pioneer in this country, or the man who has done more for this system than any other, was (the late) Sir George Livesey—a man who has deserved well of the whole community, and whose name can never be mentioned in any meeting of those interested in co-partnership without feelings of reverence, affection, and regret. The system he adopted, and which has been carried out with such admirable success in the South of London, and is day by day spreading to other parts of the country, is meeting with a degree of success which is largely due to the pioneer effort so successfully made by Sir George Livesey in his long career in this Metropolis.

On Broader Grounds than the Balance-Sheet.

People talk as if this were simply a movement to avoid contests between capital and labour, culminating occasionally in strikes, or as if, on the other hand, it was simply a movement to induce workmen to be more energetic and less wasteful in carrying out the work for which they are paid. Well, both these are excellent objects; but I do not recommend this movement because it is immediately going to show results in the balance-sheets of employers or companies. I recommend it on much profounder grounds—grounds which go much deeper into the heart of the thing. After all, I think that in our ordinary speech we lose a great deal by talking as if the labour of a man whose life is devoted to labour is in itself an evil, which becomes tolerable because he is paid for his labour, and that the payment he receives for his labour can be used to amuse him, or support his family, or in some other way when the hours of labour are over. There is an element of truth in this; but I am quite certain that the element of truth is grossly exaggerated in ordinary speech. I do not say that labour is a pleasure; but I do most emphatically say that unless the work we do in life can be inherently interesting—I do not say pleasurable, I say interesting—we have not yet got at the root of any social problem. The art of life is to make uninteresting parts into an interesting whole. No man's work is in itself, take it bit by bit, of an exhilarating character. But talk to an agricultural labourer working on a large well-managed farm, talk to an artisan engaged in some great industry, and you will find—at least, I have found—that it is a great mistake to suppose that all they care for, or are interested in, is the amount of wages they get per week, and what they can do with their wages. They are interested in the concern. They feel instinctively that they are part of a great machine, of a great industry involving the expenditure of much brains, organizing power, capital, which uses the newest knowledge, which (again using a cant phrase) is up-to-date, and they are glad to be parts of that machine. It gives them, or at all events many of them, a certain satisfaction; and they take an intelligent interest in it, although, under our existing system, all that they can get out of it is their actual industrial weekly wages, irrespective of the prosperity or of the adversity of the business, so long as the business continues.

Machinery and Interest in Work.

Let me say before going on that the introduction of machinery has undoubtedly made in many industries the work of individual operatives extremely monotonous. A man or sometimes a boy or a woman has got to do one thing, and one thing only, all day and every day. They have to look after one bit of machinery which contributes its own small quota to one complete result. That, I think, is a worse position than it was when machinery was less developed than it is now, and when each workman had to work in different stages in the one ultimate product. He had then grounds for interest in his work which seem almost removed from the modern operative, who has to deal with the most advanced form of machinery. But there is a set-off in the sense of the extraordinary beauty and complexity of the total mechanism of which the individual manipulates a fragment; and I do not believe the consciousness of that great complex mechanism is absent from the mind of the intelligent workman, although he is dealing only with a small portion of it. Well if what I have said is true, or has some near relation to the truth, is it not of enormous importance to us to try and increase this interest in a man's life—his work being, I believe, the chief interest of his life outside the family affection? I am quite certain it is the work that a man does which is the real thing that is of interest in his life. If this is so, what you have to do is to increase the interest of the workman in the work he is doing, and this you can do more by furthering the co-partnership system than by any other possible means which are open to you. You then make him feel not merely that he is part of a great organized mechanism of production, that he is a unit in the great army which is producing the goods the world annually consumes—you not only make him feel he is doing his share of the world's work and getting a fixed wage, but you make him feel that he is a shareholder in the particular co-operative work in which he is engaged. Such feeling must be invaluable. It must increase a man's interest and must make him feel that from everything that is being done well, he will gain, while from everything that is being done ill he will lose. It will make him feel that he is part of a good machine and not of a bad machine, and that his personal fortunes are more or less bound up in the success of the industrial concern of which he is a member. I venture to suggest that that is a very valuable result; and it goes deeper than the balance-sheet or the conflict between capital and labour.

The Cause of Labour Trouble Ignorance—The Remedy Intimate Knowledge.

But there is one other consideration—and it is the last I shall bring to notice—which to my mind, at all events, ought never to be absent from the thoughts of those who desire to develop industrial organization on the lines which commend themselves to us. Modern industry is an extraordinarily complex and difficult organism. It is an organism, it is all inter-connected—there is no isolated business; it is all one business, but it is a business of the most extraordinary complexity. Some of it involves an expenditure of brains, of intellect, the exercise of courage, and rapid appreciation of a difficult situation, of which I do not suppose the outside public have the smallest conception, and even the men engaged in a work probably have very little intimate acquaintance with the real difficulties which the owners of that work, be they an individual or be they a company, or what you like, have got to face; and it is because they do not fully appreciate these things that some of the difficulties between capital and labour have arisen. The quarrels of mankind are not due to the fact that mankind are bad, but to the fact that mankind are ignorant; and the more you can encourage mutual knowledge of each other's affairs by those who have to guide the enterprise and the workmen on whom they depend for carrying out their plans, the more you bring the two classes together, and especially the more you make the workmen understand the difficulties of the employer, the more I am certain you will produce a class of men in this country who are fitted to deal with all questions, be they industrial or be they political or social, and who do not exist at the present time. I speak in the presence of some of the Labour members of the present House of Commons, who agree with me that nothing can be better for the community as a whole than that the great artisan classes of the community should have the most intimate knowledge possible of business methods, difficulties, and risks, as well as business profits. That great result you will get by co-partnership; and I doubt if you will get it in any other way. If co-partnership, either in its complete form or any of its inchoate and less developed shapes, becomes general, then my firm conviction is that you will have done an enormous benefit for the social advantage of your country—not merely or chiefly because in the industries where co-partnership exists there will be no strikes, or because there will be more energy shown on the part of the workmen, and better balance-sheets and profits at the annual meetings of the company, but because, in addition to these advantages, and quite apart from and above them, there is the additional interest in the great industrial work which will be instilled into the minds of every worker in the country, and that greater knowledge of the complexities and difficulties of industrial life which is the true secret of the sympathy between one class of producer and another, which is the great guarantee of social peace and the great hope of social progress.

Retirement of Mr. William Morris.

After a service of fifty years in connection with the water supply of the Kent district of London, Mr. William Morris has lately been retired by the Metropolitan Water Board, in compliance with the age regulations. At the meeting of the Board on Friday, the Finance Committee reported that he was entitled, in accordance with section 47 of the Metropolis Water Act, 1902, to the maximum allowance of two-thirds of his salary and emoluments; and they recommended that he should be awarded superannuation to the amount of £1215 8s., as from the 27th of January next, and that his salary should be paid up to that date. In view of the long association of Mr. Morris with the Kent district, the following remarks, taken from a recent number of the "Kentish Mercury," are interesting: "The retirement of Mr. William Morris from the post of Engineer of the Kent District of the Metropolitan Water Board recalls the fact that some seventy years ago the Kent Water Company was a struggling concern drawing its supplies from the Ravensbourne just above Deptford Creek. The water was not only becoming polluted by reason of the increase of population along its banks, but the quantity was diminishing, and the outlook was most gloomy when Mr. Morris, their young Engineer and Manager, who had studied the French Artois, or artesian, method of sinking deep wells, showed them where and how to obtain a plentiful supply from the chalk beneath their feet. The strain and responsibility of the undertaking told upon Mr. Morris's health; but he lived long enough to see Kent water adopted by the Government Examiner as the standard of purity by which the water of the other great London Companies was judged. His son, Mr. William Morris, who is now retiring, succeeded him as Manager some thirty years ago; and all the great pumping-stations, reservoirs, and underground communications scattered over West Kent were designed and constructed by him."

Among the new members of the Council of the Royal Society elected at the anniversary meeting on Monday last week, is Dr. J. S. Haldane, one of the Metropolitan Gas Referees.

ROUND THE WORLD—AND SOME GAS-WORKS.

By Maurice Graham.

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XVII.—JAPAN: NAGOYA.

About four-and-a-half hours' run in the express train from Osaka brings one to the commercial city of Nagoya, the capital of the province of Oswari. The population is 300,000 inhabitants, and the general manufactures are porcelain and cloisonné. There is a Government Arsenal, which provides work for a large part of the workpeople.

Upon arrival at the railway station, nobody could be found who could speak English, so a rickshaw was taken to the Nagoya Hotel, where are the quarters of the "Welcome Society," from which particulars and general information can be obtained by all travellers and tourists. After "tiffen," the rickshaw ride was continued to the Gas Company's offices, where an introduction to the Engineer and General Manager of the Nagoya Gas Company (Mr. S. Okamoto) was obtained. This gentleman gave the writer a cordial welcome, and was ready to afford any information of interest. He was formerly Assistant to Mr. Cushman at Osaka, and had, therefore, received a good training in the building and starting of new gas-works.

Nagoya Gas Company.

The Nagoya Gas Company, Limited, was established as recently as Christmas, 1906, and by October, 1907, the whole of the gas-works sufficient for the immediate canvassed consumption were completed. Therefore, a good start at all events was made as regards showing the population what wonders could be worked by the new gas light, in competition with the electric light, which had been installed for many years. The Company had in Mr. Okamoto the very man at hand, who had passed through the same experience in a much larger city, with a population many times as great. Thus matters were made comparatively easy for the Directors of the Gas Company (who, by-the-by, are all Japanese) and their work made easier, as they knew they had at the head of affairs a technical and practical gas engineer, who would take the whole of the responsibility of construction, manufacture, distribution, and sales.

Now let us see what has taken place and what is the present [July] position of affairs. The nominal capital of the Company is yen 2,000,000 (£200,000) in yen 50 shares (£5), with a paid-up capital of yen 12·50 (equivalent to 25s.) per share, and a second call of yen 5 (10s.) per share, which is due in October of this year. The fully-paid up capital will then be yen 700,000, or £70,000. The first half-year's dividend, declared at the half-yearly meeting held in May last, was at the rate of 4 per cent. per annum, and the next half-yearly dividend, to be declared in November, will be at the rate of 8 per cent. per annum.

The present [July] price of the partly paid-up shares, of which yen 12·50 (25s.) has been paid, is about par, owing to the new start of the Company and the first dividend, which the Directors very wisely kept low on account of having heavy establishment charges on such a small output. But now the output is rapidly increasing, with only the same cost of administration; so that the dividends will rise just as quickly. There is a stipulation made by the Government in the 50 years' concession or franchise of the Company, that not more than 12 per cent. per annum can ever be paid in dividends; and the Gas Company have the usual opportunity of creating a depreciation, sinking, and reserve fund in preference to passing the balance over to the Government. This stipulation is a valuable asset to the shareholders, and should give the shares greater ballast than would otherwise be the case. Article 29 of the Company's regulations, resolved at the general meeting of the organization held on Nov. 5, 1906, says: "The net profit of the Company should be the remainder of the gross income, from which are deducted all the outlays and losses; and after a resolution of the ordinary general meeting, it is distributed in the following six items: 1. Reserve fund; 2, special reserve fund; 3, bonus for officials and others; 4, remuneration for the retired; 5, dividend to the shareholders; 6, amount carried over to next term." Other regulations of the Company deal with general provisions—such as: Article 1, "The object of the Company is to supply coal gas and to do any other business connected with it"—shares, officials of the Company, meetings of the shareholders, and accounts. Article 14 reads: "The Company should appoint seven Directors and three Inspectors, who should be elected from among the shareholders holding 100 shares or more." Article 17: "The Directors should, by mutual election, vote one President and one Procuratory Director." Article 18: "The President is entitled to represent the Company, and the Procuratory Director to manage the Company's affairs." Article 19: "The President is entitled to decide the salary of the Company's Manager and the other clerks, and also to appoint or remove them, by a resolution of the Board of Directors." These articles are quoted verbatim, as among the more interesting of the 31 regulating the Company, called the "Nagoya Gas Kabushiki Kaisha," with head office in the City of Nagoya and works at Gokiso Mura, Aichigun.

The first balance-sheet of the Company, adopted in May, 1908, showed: Total liabilities, yen 2,193,613·728, including the profit account of yen 14,369·739, which was distributed as follows:—

	Yen. Sen.
Taxes to Municipality	488,790
Reserve fund	1,000,000
Special reserve fund	450,000
Bonus for officials	1,150,000
Remuneration for the retired	143,700
Dividend to shareholders	10,000,000
Account carried over to next term	1,137,249

One yen = 100 sen or 2s. Dividing the number of yen by ten gives the result in English pounds.

The general increase of consumers is so rapid that it is over 10 per cent. per month; and as there are 2200 consumers on the books at the time of writing [July] the increase is at the rate of 220 consumers per month, or 2640 per annum. Compare this rate of increase with that of the Osaka Gas Company, and, in proportion to the population of the two cities, it will be seen that the smaller concern is increasing more rapidly than the larger.

Offices and Show Rooms.

All the drawings and details of the offices and works were made by Mr. Okamoto, and the work carried out under his supervision. He has certainly kept in view the importance of large area, loftiness, and good ventilation in the design of his block of offices, which stand alone in the main centre of the city. Upon entering, one can see he has adhered to the system of introducing first of all the sales department to the notice of the visitor or customer, whose wants can afterwards be attended to by the clerical staff, who are in full view and near at hand.

The stock or show rooms are equipped with a suitable collection of fittings which have been found of the greatest service in Japanese households. While on this subject, it will be of interest to mention that the Gas Company hire or loan out all gas-cookers, fittings, &c., at a rental of so much per month, and even hire out burners and mantles, for which they charge the small sum of 4 sen (the equivalent of 1d.) per month. There is also a gas-engine working in full view of the public; and this has been responsible for the introduction of over 60 gas-engines, which take 55 per cent. of the gas made. There are a number of saw mills in the neighbourhood, which are gradually installing gas-engines. Besides these, general factories find this class of power cheaper and more convenient than steam or electricity.

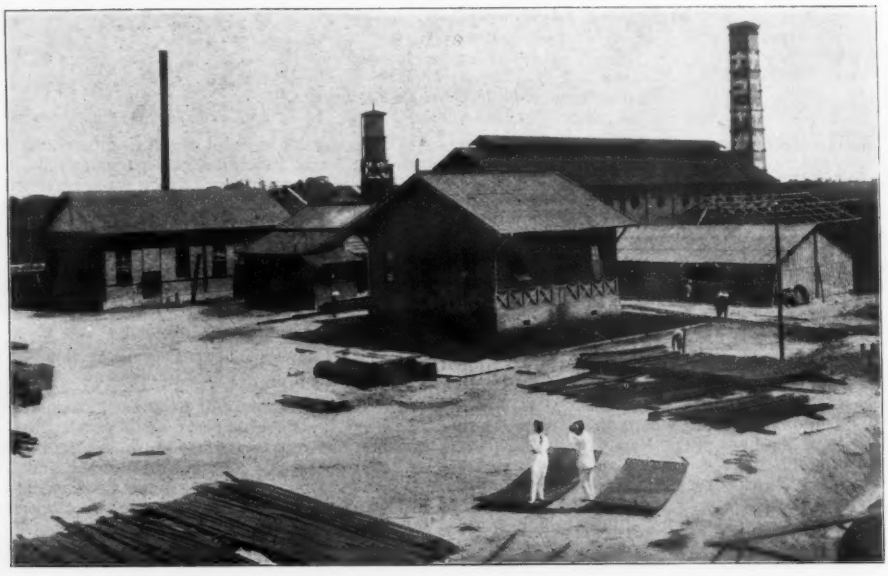
Upstairs on the first floor are large and well-designed rooms that would give points to many European offices visited. These are the Directors' Board meeting room, Engineer's offices, laboratory, and a general store room for documents. The designer of this building has considered the prospect of rapid development, and has decided that these offices will meet the demand for accommodation for at least ten years, whereas his gas-works require extensions, additions, and renewals daily.

Nagoya Gas-Works.

Tea having been served in the usual Japanese custom, and having generally discussed gas matters, rickshaws were ordered, and after going along the main street for about a mile and turning to the left, a huge plain under rice cultivation was reached. In the centre of this rice plantation stood the gas-works, in an area of 49 acres—thus having plenty of land for extensions as long as the concession lasts. The more modern the appliances and apparatus for making gas, the less area the plant appears to take up. The price paid for this land in the first instance was equal to about 1s. per square yard. Since then the Government have begun, and nearly finished, a navigable canal (by which coal and coke can be taken to and from the gas-works) running through the centre of the land to the city and connecting with the Arsenal. The price of the same land at the present time, the writer was informed by Mr. Okamoto, is 5s. per yard; so that the present paid-up capital of the Company is assured in land value alone. The area of land not used by the Company at present is leased for short periods.

The retort-house chimney and spiral gasholder are the first points noticeable as prominent features of these gas-works, for they are decorated with Japanese lettering, representing the name of the Gas Company. (See Photograph No. 152, which shows the Japanese lettering on the chimney).

The general design of the buildings throughout, as seen by the Photographs Nos. 152 and 154, is quite original, and is after the Japanese style of architecture, with a touch of the heavy hammer, as it were, thrown in to make them more solid to withstand the heavier work. The writer was greatly pleased to find that at last he had discovered a gas-works out of the ordinary conventional design and style, and wondered how it came about. His query was answered by the Engineer informing him that his instructions were to do everything on the very simplest plan, and to adhere to the wooden buildings, which were quite good enough. This Mr. Okamoto did, and finished off his buildings with a good coat of



Photograph No. 152.—View of the Nagoya Gas-Works.

The Japanese Lettering on the Retort-House Chimney represents the name of the Gas Company. Behind, and parallel to, the Retort-House are seen the Coal-Store Roofs. The tall covered apparatus is the Tubular Condenser. The small middle Building is the Exhauster and Washer Room. The Purifier-House is in front, surrounded by oxide. The far Building with a Steel Chimney is the blacksmith's and general repairing shop. The figures in front are Mr. S. Okamoto, the Engineer and Manager, and his Secretary.

dark grey paint, which makes a very pleasing picture and enhances the neat appearance throughout.

Crossing the yard, the retort-house is entered. It is built in European style, with red brick (see Photograph No. 152), and would perhaps have been more in keeping had the Engineer kept to the Japanese style of building, and made it with brick or iron columns and a wood structure, allowing plenty of ventilation in this land of heat. However, he conformed to convention in this instance, and also in his design of chimney, which, nevertheless, he embellished with Japanese letters, as already referred to and illustrated. The house contains two benches of four beds each; six retorts, 7 ft. 7 in. long, single ended, and 21 in. by 15 in., being in a bed. The first bench was built to the Engineer's own designs, and is to be seen in Photograph No. 153. Both benches are heated by regenerative furnaces, the producers of which are fed from the side of the retort-bench where the charging and drawing are done. The clinkering of the producers is done from the opposite side. The retorts are set on the horizontal system, and are charged by hand scoop and drawn by the ordinary rake. Scoop work appears to be more easily learnt in Japan than shovel charging by the retort-house men, who are there to-day and gone to-morrow; perhaps rickshaw men one day, stokers the next, and in a hotel the third.

The second bench was being built by the Engineer's men to German designs and with German material. All future extensions (which will probably be required next year or the year after) will be with 20 feet horizontal through retorts, with charging and drawing machinery on one side of the bench—or possibly with vertical retorts, upon which subject the writer has had many chats with various engineers, expressing to them his favourable views.

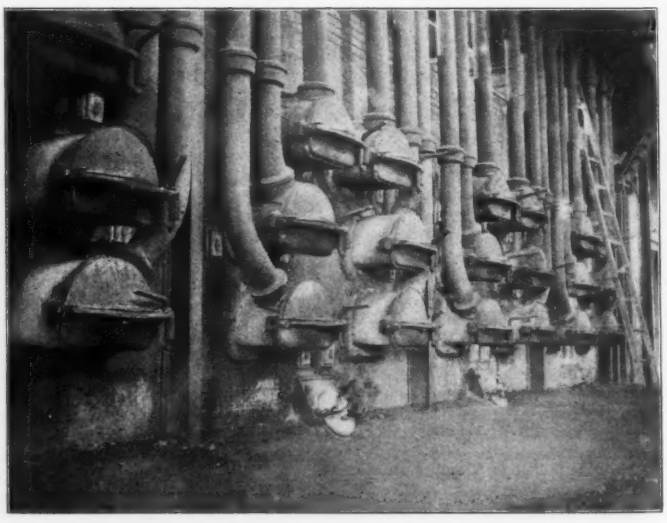
The weight of the present charges is 300 lbs. per retort, with charges every six hours. The stokers work twelve-hour shifts, during which they attend to the complete working of one bed of six retorts, charging, drawing, feeding the furnace, and clinkering. In other words, they charge twelve retorts, equal to 1½ tons of coal, draw the coke, quench it from a hose pipe, and take it to the yard. Their wages are sen 60, or 1s. 3d., per shift, which is good pay for this country, where everything required by a Japanese workman is very cheap, such as rice and cotton clothes.

The coal used is known as Kiyushu and Hokkaido, and is stored, to the extent of about 1200 tons, under cover parallel to the retort-house. The roofs of the coal-stores are seen in Photograph No. 152 beyond the retort-house. The coal is taken to the retort-house in baskets. There is a good local demand for coke, which is sold at the equivalent of 15s. 6d. per ton to a contractor in the town, who retails it. This is the usual custom when starting gas-works, so as to get rid of the responsibility of having the coke on the Company's hands.

Passing to the next house is noticed a tall tubular condenser, seen in Photograph No. 152, which also shows other buildings of neat design in wood. The smaller house in the middle is the exhauster-house, where there is a complete new outfit of two sets of 12,500 cubic feet per hour engines and exhausters on combined bedplates by Messrs. Waller and Son. Everything in the house (and the gauges in particular) looks beautifully clean and tidy. This house also contains a Pelouze tar-extractor and a "Standard" washer, both well painted and clean.

The purifier-house is seen in the front of the same photograph, with oxide of iron spread round about it. There are four boxes, 12 feet square by 5 feet deep, with ordinary covers and water-lutes. Oxide of local make, consisting of cast-iron filings and borings prepared with sawdust, does all the work at present required; but it is anticipated that this will not be sufficient when the make of gas increases next year. Baskets are used for carrying the purifying material.

The gasholder at present working is a spiral one by Dempster's, of a capacity of 80,000 cubic feet. The writer commented upon its good appearance, meeting with a smile and an answer to the effect that this holder was once a new one at Tokyo, but has now found a home at Nagoya.



Photograph No. 153.—Inside the Nagoya Retort-House.

At the present time, the yard is taken up with new material delivered by a German firm for a new gasholder of 500,000 cubic feet capacity just being erected, as shown in Photograph No. 154 (Mr. Okamoto and the writer are seen standing near the lamp post). All the material is marked with erection marks; and Mr. Okamoto was asked whether it was necessary to send foremen or inspectors out to superintend the erection. He replied: "No. I never want them. We do all our own erection work and let it piecework to travelling Japanese gas erectors, who come round directly they know there are any extensions going on. For the gasholder and steel tank, all complete, including riveting and erection, I pay yen 30 (£3) per ton, paid when tested with gas in

Photograph No. 154.—Another View of the Nagoya Gas-Works.

The Building at the left on entering the Gas-Works' Gate is the General Office and Meter and Governor House. The Building next to it is the General Stores. On the right is the mechanics' shop, with an outside staircase leading to the joiners' shop above. The erection work progressing is a new steel tank and gasholder, with standards and outside framing.
The two figures standing near the lamp-post are Mr. S. Okamoto and Mr. Maurice Graham.

the holder. As regards my retort work, I only require the drawings of the furnace and fittings, and we do the work. You see the cost of European erection is very heavy."

Such was the opinion of the Engineer of these gas-works; and it will be noticed that it confirms the view already given in the previous article on Osaka. The writer personally examined the work under progress and the method of riveting, and must certainly say it was equal to any done in England. The Japanese have a few different methods of arriving at the same result. For example, an English joiner planes the wood and produces the shaving as the plane is pushed from the body, whereas a Japanese joiner pulls the plane to his body. The result is the same and equally good work is done in both ways and in both countries.

The meter and governor are housed in the first building on the left on entering the works, shown in Photograph No. 154. The jet photometer indicated a gas of 15-candle power.

There is a good mechanics' shop, with machine tools, such as lathes and drills, &c., above which is the wood workers' and joiners' shop. These are clearly seen on the right of Photograph No. 154, with the outside staircase leading up to the carpentry department. In addition to these workshops is the blacksmith's shop, which is the building seen in Photograph No. 152 under the tall steel chimney. All these shops are useful and economical, as the general cost of having work done outside was such a large item of expenditure.

There is a small, new German sulphate of ammonia plant, producing salt at the rate of half-a-ton per day; this bye-product being eagerly sought after locally. Tar also meets with a good demand at the price of 10 sen, or 2½d., per gallon. It is sold in old kerosine tins or cans, which are filled with tar and soldered up again.

The present annual output of gas at these works is about 34 million cubic feet, and the maximum daily make 300,000 cubic feet; but as the increase is so rapid, such figures are of little significance. It is anticipated that the output will be doubled by Christmas, 1909.

Japanese Street Lighting.

The laying of mains is found to be the heaviest item of expenditure in a new gas company. At present, 60 miles have been laid in Nagoya; and the Company are still laying them at the same rate as the general increase of consumption. Of course, where gas-works are built in a big town of 300,000 people, there must, to start with, be a continual increase all round.

Next year a high-pressure main will be laid to supply gas to the Nagoya Exhibition across the Canal, at a distance of about a mile from the works.

The general lighting of the city is done by Japanese house lanterns, which are seen outside each building in the typical street scene illustrated in Photograph No. 155. Good lighting can be seen in the large shops and buildings. Lucas lights are adopted in places, and give a good general effect and impress the public with the superiority of gas lighting over the electric light, with which there is keen competition.

The price of gas is yen 2·40, or 4s. 10d., per 1000 cubic feet for lighting, and yen 2, or 4s., per 1000 for power purposes. Electricity is charged for at so much per lamp.

The gas-meters are all dry ones, as at Osaka; and slot-meters have not been pushed, for reasons previously given.

All fitting and plumbing is done by the Company, whose men are working night and day to execute orders on new houses.

Mr. Okamoto mentioned in conversation the difficulty there was to get a Japanese cook to change from his charcoal and to burn gas; and the writer was able to say that the same difficulty was met with in all Oriental countries. The cook gets his gratuity from the oil and charcoal merchant, but not from the gas company. The writer therefore suggested that, as there was no Japanese law to prohibit Christmas boxes, the Gas Company should promise the cook a suitable present at the end of the year, provided he kept his cooker clean and there were no complaints due to neglect of the apparatus. This is legitimate business, as everyone is aware of the real nature of the cook's objections to gas. Perhaps gas companies in other countries may take the hint, and make a success of it.

Photograph No. 155.—A Street Scene in Nagoya, showing the Japanese Lanterns hung outside each Building, for Lighting the Street.

Japanese House Lighting.

Just a note about the general interior lighting of tea houses and private houses. The Japanese do not like brilliant lights, and prefer the small inverted burner, consuming only about 2 feet per hour, as the style of Japanese decoration in all houses does not require brilliancy of light. This is owing principally to the absence of furniture, and, secondly, to the decorative art screen-work, which shows to advantage in dim light. One notices in Japanese rooms that the screens and walls are mostly covered

with paintings of landscapes and similar views, and are such that a brilliant light would entirely upset the artistic conception of the artist or decorator. The "Bland" light seemed in great demand, and suited the position admirably.

The afternoon drawing to a close, and the writer having to catch the "sleeper" to Kozu, he thanked Mr. Okamoto, the Chief Engineer and General Manager, for his kindness in showing him round the offices and works, and for supplying the information embodied in this article. As regards the future success of the Nagoya Gas Company, and the early prospect of paying the full 12 per cent. dividend, the writer's long gas engineering experience leaves him without any doubt that this will be accomplished within two years, while at the same time conforming to the regulations of the Articles of Association.

The railway journey from Nagoya to Kozu takes seven hours. Gotemba was reached in the early morning, and a magnificent view of Fuji Mountain, over 12,000 feet in height, was obtained. From Kozu, a start was made for Miyanoshita, a mountain health resort, with hot mineral springs and dry cool air. Leaving this, in rickshaws, the pathways lead through mountain scenery beautifully green with new foliage of all descriptions, and with here and there a wayside tea house. The coolies bathe themselves and try to obtain a more picturesque freshness than their "steaming" appearance after pulling their heavy loads up these mountain sides. Suddenly Aski or Hakone Lake comes into sight, and Hakone-Moto is reached. The beautiful and peaceful lakeside scenery, with lovely views of Fuji mountain tipped with snow, was enjoyed for the next few days. Near by is the Mikado's summer palace. Five hours on horseback brings one to Atami, a watering place on the sea, where are geysers and hot springs. Later, by rickshaw, tram, and train, Kamakura, a seaside resort and once the capital of Eastern Japan, is reached, where a stay of several days was made.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Old Kent Road Gas-Works.

Upwards of seventy members of the London and Southern District Junior Gas Association assembled at the Old Kent Road works of the South Metropolitan Gas Company on Saturday afternoon—perhaps a record number for a visit—in fulfilment of an engagement which was made some months ago, when Sir George Livesey promised he would meet and address the members. The unhappy event that has intervened cancelled one part of the programme—and the part which was doubtless the more eagerly looked forward to; but the other portion of the fixture—the inspection of the works—was duly carried out, under the guidance of the Chief Engineer, Mr. Charles Carpenter, who devoted his Saturday afternoon to the purpose. In explaining the features of the plant to the visitors, he was assisted by Mr. T. S. F. Gibson, the Works Superintendent, Mr. R. H. Collins, and Mr. D. Chandler. Mr. Henry Austin, one of the Workmen-Directors, who is a member of the Association, was also present to help in welcoming the visitors.

On arrival, the members proceeded direct to the Workmen's Institute, which is in the ordinary way used for concerts, competitions, whist-drives, &c. Attached to it is a handsome billiard-room and a kitchen. When they had assembled in the Institute, the party were welcomed by Mr. Carpenter, and presented with copies of a brief printed description of the works. To the particulars therein contained, Mr. Carpenter was kind enough to add by a few remarks that were helpful to the visitors in their subsequent inspection. The Institute itself, he pointed out, is a building which was erected in 1859, as offices; and at one end was the room used for his work by Sir George, when he filled the position of Engineer and Secretary to the Company. A tablet on one of the walls records the fact that the building was converted to its present use and opened by Sir George on April 22, 1908. The artificial illumination is carried out by means of concealed lights. This is found to be extremely successful, resulting in a beautifully diffused light.

Referring to the history of the works, Mr. Carpenter said they were really the playground of Sir George Livesey, who was brought up there as a child. On one side as they passed along, the members would see a row of small houses, one of which was formerly occupied by his father, Mr. Thomas Livesey, when he was Secretary and Manager. Walking on, they would come to a column, which was interesting as it formed part of the framing of a holder the tank of which was constructed by the Company as far back as 1845. One of the points with regard to the South Metropolitan Gas Company was that they had for many years done much of their work themselves. They had not built gas-holders; but they had put in several tanks, and done other things of a similar kind. In fact, they had made a practice of doing as much as they could themselves, and the column he referred to belonged to the holder in connection with the first tank which they so built. Then nearby there was a chimney, which was a little curious in regard to construction. The shaft itself was parallel; and to strengthen it there were piers or buttresses, thick at the bottom and tapering away to nothing at the top. This being a little out of the ordinary at the time, Sir George had a good deal of trouble in getting permission of the authorities—the Metropolitan Board of Works—for its erection. In the end, however, he succeeded; and this was characteristic of the man. They would also see a retort-house, not working now, which contained thirty settings of tens, and on the site of which originally stood a church. This was Christ Church, which was pulled down some forty years ago.

Mr. Carpenter next touched upon the more salient features of the works as they exist for the production of gas to-day. He pointed out to the members that they would pass a cyanide plant, which, however, would not be open for inspection, because it was a highly technical process, and was not one that could be easily shown to a party. They were at present working on a large experimental, or a small working, scale of one-tenth of a ton per day. Then there was Hills's process, which was an arrangement for driving off largely carbonic acid and sulphuretted hydrogen from the crude liquor, so that the liquor might again take up these two things from the crude gas—the liquor, after cooling, being returned to the washers, where it was very caustic. The gases driven off in the process were treated with the incoming liquor in order to save the free ammonia; and then they went to the Claus kilns for taking out the sulphur. One of the chambers had been left open, in order that the members might see the form in which the sulphur was deposited. A great deal of work had been done at Old Kent Road in days gone by in regard to purification in closed vessels. Many chemists, in addition to Hills, Laming, Sugg, and Sir George, endeavoured to perfect the process; but for one reason or another it had not become a success, and they were to-day purifying in oxide vessels, as was done sixty or seventy years ago. Another point of interest was the pipe-ground; and in this connection he would point out that 90 per cent. of the pipes laid by the Company, from 48 inches downwards, were full turned and bored. They made admirable joints; and the Company not only used them for their mains in the streets, but in connection with the pipes for liquor and tar pumps, &c., on the works. It was difficult to get a good sound joint in the ordinary way where ammoniacal liquor was concerned; but they found the turned and bored method an admirable one for this purpose, and he did not think they would see a leaky joint anywhere. They learnt a good deal of what they knew about turned and bored pipes from Liverpool.

Naturally, the members, in the course of their inspection, found particular interest in the modern retort-houses, of which there are four, each containing sixteen settings of tens, 20 feet long, which are worked with six-hour charges of about 7½ cwt. of Yorkshire and Durham gas coal. The retorts are charged by West compressed air machines; while the discharging is carried out by means of the Hunter and Barnett patent pusher—the last-named of the two inventors being a member of the Association. These dischargers are, Mr. Carpenter declared, found to work very successfully. Outside producers are used for generating gas for firing the retorts; and the working of these was also gone into as fully as possible by the visitors. There are two producers to each house. The coke falls from the retorts into hoppers under the stage, where it is quenched, and, after draining, is allowed to fall into trucks and then drawn out of the retort-house by endless wire ropes driven by gas-engines, being finally tipped on the coke-heap. This system is found to produce a very small quantity of breeze. The pan-breeze from the producers is washed and sorted into various sizes of coke and clinker in a breeze-washing plant. The total make of gas of each retort-house averages about 2½ million cubic feet per 24 hours. All the coal is brought to the works in barges, which are unloaded by steam cranes fitted with Hone's grabs.

The hot coal gas is drawn from the retort-house through vacuum governors by four exhausters driven by two "Farey" compound condensing engines. It is then condensed in four sets of reversible water-cooled condensers, each consisting of twelve 24-inch vertical pipes having sixteen 2-inch water-tubes in each; the gas travelling in the opposite direction to the water. It next passes to the Livesey washers, which are worked in two sets of three, and then to the scrubbers and purifiers—the latter (which are worked in sets of six, each about 40 feet by 30 feet by 5 feet deep) being charged with hydrated oxide of iron. After going from the last purifier through naphthalene washers containing tar oils, the gas is measured by the station-meters, the drums of which work in concrete tanks sunk in the ground, whereby the expense of a meter-house is saved. The total storage capacity at the Old Kent Road is 11½ million cubic feet; and as the gas made there is not sufficient to supply that part of the district, an additional quantity is pumped from East Greenwich, through about 4 miles of 48-inch main, by means of centrifugal fans. The pressure given by the holders is also supplemented by fans during periods of maximum demand.

The works are in two sections—the old and the new—and the combined area is about 33 acres. There are workshops for cleaning and repairing gas-cookers, fires, meters, lamps, and fittings. On the recreation side, there is a flourishing athletic club. In

connection with the sulphate making plant, the members were able to see a saturator which is being built on the Williams principle, which, it may be remembered, formed the subject of a lengthy correspondence in the "JOURNAL" columns a short time ago. The party, after passing through the handsome offices, terminated their tour of inspection in the Board-room, where they gazed long at the excellent portrait which hangs on the wall of Sir George Livesey, during the great strike in December, 1889, which was presented by the subscribers to the "George Livesey Testimonial Fund" on Aug. 20, 1890. Thereafter the visitors, to the number of eighty, sat down to tea with Mr. Carpenter in the dining-room; and at its conclusion the thanks of those present for the welcome accorded them were suitably expressed.

The President (Mr. W. J. Liberty) said he did not think it would be a very exaggerated figure of speech if he stated that this was a very proud day in the annals of the Association. They were on historic, and he might even say hallowed, ground. The spirit of Sir George Livesey seemed to permeate the whole of the works. When he approached Sir George last August and asked him to meet the members, Sir George quite of his own free will expressed the wish that they should come to him at the Old Kent Road, in order that he might make their acquaintance. They all thought this was an extremely kind offer; and then, of course, unhappily everything fell to the ground. He hardly liked taking up the matter further, and writing to Mr. Carpenter to ask if he would meet them. He did so, however; and Mr. Carpenter said he would be there—he could not take the place of Sir George Livesey, but he would show them what there was to be seen. When Mr. Carpenter received them on their arrival, he gave them an interesting speech, which had enabled them to follow what they saw afterwards. For all this they thanked him most heartily. Another reason why they were glad to be there that day was because they regarded this as the home of the co-partnership system—not, of course, the Rochdale scheme of co-operation. Fifteen years ago, there were only 77 co-partnership or co-operative schemes in existence; while there were now 112. Of the gas companies who now had co-partnership schemes, the figures relating to five were available. These companies had a capital of £12,185,000, and they employed 7200 men, in round figures—nearly 6000 being with the South Metropolitan and the South Suburban Gas Companies. The total amount distributed by the five companies under their schemes was £496,879, of which the South Metropolitan officers and workmen had received £427,279. He saw in these figures a great potentiality for settling once and for ever the hitherto interminable strikes and discords, and creating lasting harmony between masters and men. When they saw the Rt. Hon. A. J. Balfour and Mr. Shackleton foregathering on this question, and both blessing such schemes, they had good reason to think that co-partnership as commenced in London, in connection with the South Metropolitan Company, was well worthy of being copied. He noticed that it was proposed to put up a monument of some kind to Sir George Livesey; but no enduring bronze or the hardest of granite would stand so long as would the great scheme he had been referring to. It was a monument; and a greater one they could not have. Only that very week it had been announced that the Croydon Gas Company had adopted profit-sharing. The Association were at the Old Kent Road on a unique occasion; for he believed it would be the last time that Mr. Carpenter, as Chief Engineer of the Company, would conduct a party of visitors round the works. It gave them great pleasure to be there that day to congratulate him on his election to the Board of the Company. (Loud applause.)

Mr. Walter Grafton asked the members to return Mr. Carpenter a hearty vote of thanks for the hospitality, care, and attention shown to them that day. His appointment as a Director was one that augured well for the Company.

Mr. W. Upton seconded; remarking that the Association had met several times under the ægis of the South Metropolitan Gas Company, and he trusted Mr. Carpenter would give them the privilege of visiting the Old Kent Road again on some future occasion. There were so many points of interest about the works that he was sure they would all be glad to come again and finish their inspection, which he thought was really only just begun. The cleanliness of the works was a very great moral point, and an example that was well worth copying.

The proposition having been carried by acclamation, Mr. Carpenter said he thanked them on behalf of the Company for the vote. The works they had seen that day were perhaps a little bit difficult to follow—especially in view of the fact that a plan did not accompany the short description that was distributed among the visitors. He, however, liked Mr. Upton's idea of arranging another day to finish the inspection; and if it was at any time possible to fix this up, he could assure the members that they would receive a similar welcome. Talking of orderliness, he regarded the tar works at Ordnance Wharf as the really orderly picture they had to show in their Company; and what the Old Kent Road and other works had been endeavouring to do was to live up to the high standard set by the tar works. With regard to the work of the Association, and other similar ones, the idea in the minds of the members was no doubt—as should be the case—to improve their knowledge of their profession and their position in the profession; and he could not conceive a better method of doing so than by regularly attending the meetings of such an organization. He belonged to several Associations quite early in his gas career; and the good they did him was incalculable. He thanked them again heartily for the warmth of their vote; and on behalf of the Company, he said they were very pleased indeed to see the members. The South Metropolitan Company had always kept what he might call "open house." They had always welcomed anybody or everybody who wanted to see or learn anything. If anyone wanting information wrote to the Company, somebody was always deputed to see that it was supplied.

Mr. F. Ainsworth proposed a vote of thanks to Mr. Carpenter's assistants for the great attention that had been paid to the visitors in going round the works. He, for one, would certainly like to repeat the visit on some future occasion. He thought the number present that afternoon was the largest muster the Association had had for a visit to a works; and if they came to the Old Kent Road again, he was convinced the party would be quite as big.

Mr. J. E. Henwood seconded, with the remark that they all fully appreciated the kindness shown them by Mr. Carpenter and his assistants; and the vote was heartily accorded.

SYNTHESIS OF METHANE.

At a recent Meeting of the Chemical Society, a paper on "The Direct Union of Carbon and Hydrogen and the Synthesis of Methane," by Professor W. A. Bone and Mr. H. F. Coward, was read and discussed.

According to an abstract of the paper in the "Chemical News," the recent work of Berthelot, Pring and Hutton, and Mayer and Altmayer, on the above-named subject was critically reviewed by the authors. The results of new experiments were described which demonstrate the formation of large quantities of methane when less than 0·1 gramme of sugar-charcoal (highly purified by prolonged ignition in dry chlorine, first of all at 700° C. and then at 1100° C.) is heated in a stream of pure, dry hydrogen to between 1100° C. and 1200° C. in an apparatus similar to that used by Bone and Jerdan in 1897. In two separate experiments, the yields of methane—viz., 137 c.c. and 125·5 c.c. at 0° C. and 760 mm. from 0·0995 and 0·092 gramme of carbon respectively—were as much as 73 per cent. of those theoretically obtainable; the remainder of the methane being lost by unavoidable oxidation or decomposition in contact with the intensely hot walls of the porcelain tube in which the carbon was heated. In one group of four experiments, the formation of altogether 422 c.c. of methane from 0·306 gramme of carbon was demonstrated. The authors therefore considered that the synthesis of methane from its elements, as originally carried out by Bone and Jerdan in 1897 and 1901, was fully confirmed.

In the course of the discussion upon the paper, Dr. Feilmann asked Professor Bone if he could supply information as to the black substance formed by the methane on the walls of the porcelain tube in which the reaction took place, and suggested that it might contain carbon, due to decomposition of the methane formed. Such decomposition might be promoted both by the walls of the tube being presumably rather hotter than the body of the gas, and also by the special action which was well known to be peculiar to solid surfaces in similar circumstances. It was difficult to believe that the coloration could be due to the formation of silicon in the porcelain, and it presumably contained no lead. In reply, Professor Bone said he was afraid he could not give any definite information as to what particular constituent of the porcelain or the glaze of the inner tube had been reduced by the methane; presumably it might be the silica, and certainly the appearance of the tube suggested this. With regard to the mechanism of the process, it might be either a direct reduction by methane itself, or a secondary effect due to carbon liberated by a primary decomposition of methane in contact with the hot surface.

The London and Southern District Junior Gas Association will meet next Friday at the Cripplegate Institute for the purpose of hearing a paper by Mr. W. Briggs, on the "Production of Hot Water by Gas."

Purification of Extracts Containing Sulphur.—A specification has been taken out by the French Company working the Bécigneul and Berger process for a method of treating the extracts containing the sulphur obtained from gas-purifying material. According to an abstract given in the "Journal of the Society of Chemical Industry," the object of the invention is the purification of the solution of sulphur obtained by extracting, with carbon bisulphide or other solvent, the spent material before or after de-cyaniding. The solution is agitated with sulphuric acid (50° to 60° Baumé). This dissolves the carbides, which are thus extracted from the solution, and further yields with these carbides insoluble sulpho-conjugated compounds, which ultimately become resinified and carbonized. It also resinifies and carbonizes the tars, rendering them insoluble. The resulting black deposit and the excess of acid are removed by filtering through powdered gypsum, and the filtered solution is completely decolorized by a further filtration through clay or animal charcoal. It is then evaporated. The extraction and purification are carried out in a series of vessels which communicate directly with each other, in order to avoid loss of solvent, and are also connected to a gasholder to ensure equalization of pressure. When the solution of sulphur becomes super-saturated by evaporation, steam is passed through it, so as to cause the deposition of sulphur as small crystals free from enclosed solvent.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

An Afternoon for Questions and Answers on Different Subjects.

A Meeting of the above Association was held on Saturday afternoon at the Manchester Technical School; there being a very representative attendance. Mr. J. TAYLOR, the Vice-President of the Association, occupied the chair in the absence of the President, Mr. E. J. Wellens. The afternoon was devoted to the answering of questions sent to the Hon. Secretary (Mr. J. Alsop) on subjects of interest to the members. The following are the chief questions dealt with and the answers summarized:

"*What is the correct method of watering meters*—(a) *With gas turned off at main cock;* (b) *with gas turned on at main cock but no light going;* (c) *with gas turned on at main but no lights on?*"

A great deal (it was submitted in answer) depended on the make of the meter to be dealt with. The generally accepted method was to turn the gas off at the main cock, open the nearest tap on the fittings, take out the plug on top right-hand side of the meter and the plug at the bottom right-hand side, and water. After the water has stopped running out at the bottom plug, insert both plugs and light the gas. With the main cock turned off and no taps open, the meter becomes air bound; consequently no gas will pass. In meters of the West and Gregson type, also some of the Braddock type, one cannot water them satisfactorily except with lights on. With the gas turned on and no lights going, one would not obtain as good a level of water in the meter as would be the case if the gas was off and the meter allowed to syphon in the usual manner. Mr. R. H. Garlick gave some interesting details of his experiences on this subject. He always found it best to pass the water to the meter with the gas on. Mr. Carter (Garston) and Mr. Hodgson (Ashton) followed on the same lines.

The meaning of a phrase: "*Does not the sentence 'to pass* 18 *feet per hour' on a* 3*-light meter mean that the meter will pass at least* 18 *feet per hour at* ½*-inch pressure? If the pressure is increased, say, to* 3 *inches, will the volume be increased according to Boyle's law?*"

The answer to this question was that the words "to pass 18 cubic feet per hour" on a 3-light meter does mean that it will pass 18 cubic feet per hour at ½-inch pressure; but if the pressure be increased to 3 inches, the volume will not be increased according to Boyle's law, as Boyle has stated that the greater the pressure the less the volume, and is only applicable to gases in a confined space. Hence, by Boyle's law, we get half the volume by increasing the pressure twofold; but this law does not apply to gas-meters, as the following figures—the result of an actual test by the answerer—will show: A 3-light meter, 125 per revolution, at ½-inch pressure, passes 18 cubic feet per hour; at 2 inches, 36 feet; at 3 inches, 45 feet; and at 8 inches, 72 feet.

Right of inspection of meters.

This question had reference to the prosecution of a meter inspector for entering a house while the occupants were out, but who had left the key in the door. What is the law relating to this point? The following reply was given to this: The Gas-Works Clauses Act, 1847, has a section which has been confirmed or improved by the Gas-Works Clauses Act, 1871. Section 21 reads as follows: "Any officer appointed by the undertakers may at all reasonable times enter any building on land lighted with gas supplied by the undertakers, in order to inspect the meters, fittings, and works for the supply of gas, and for the purpose of ascertaining the quantity of gas consumed or supplied; and if any person hinder such officer as aforesaid from entering and making such inspection as aforesaid at any reasonable time, he shall for every such offence forfeit to the undertakers a sum not exceeding £5."

Method of cutting an old main and inserting a branch pipe.

One member wanted to know what ought to be done under the following circumstances: "It is necessary to cut out a piece of 12-inch main for the purpose of inserting a branch 12 in. by 8 in. The main is an old one, and very rough on the interior—so much so that when three bags are inserted at each side of the proposed cut, they fail to stop the flow of gas in either direction." It was assumed for the purposes of the answer that the author of the question desired to know how he could make the place safe for the men working, and prevent an explosive mixture getting about, not so much as to prevent a slight leakage of gas. "Seeing that three bags on either side of the proposed cuts is not sufficient," ran the answer, "to keep back the gas, the proper course would be to drill a ½-inch or ¾-inch hole between (say) the second and third bags, and screw in a piece of gas-pipe, 6 feet or 8 feet high, to act as a chimney for any gas that leaks past the third bag; then between the first and second bag on each side drill ¾-inch holes, one on the top and one on the under side of main; plug the bottom one, and pour in at the top some fairly stiff cement between the bags; insert the plug, and proceed to make the necessary connection as quickly as possible. If done smartly, the cement will not have set, and can be got out at the bottom plug before the bags are taken out. Should there be a good fall in the main, and a syphon near, it could be deposited there."

In the discussion, the opinion was expressed by several speakers that if the cement got set it would be awkward to get out; and Mr. Taylor thought in such cases it was better to have stoppers in place of bags.

Comparative life of incandescent mantles.

The comparative life of incandescent mantles used in street lighting was raised in a further set of queries sent in by a member. First he desired to know if it was advisable to fix incandescent lamps to tramway poles. To this a reply was in the negative, because of the excessive vibration caused by the over-head equipment. Opinions varied considerably on the question of the comparative life of mantles—namely, (*a*) lanterns on wall brackets, and (*b*) lanterns on columns. Contributing to the discussion, Mr. Alsop said that a great deal depended on whether the lamp-column was rigidly fixed and upon a good foundation. For further information on this point he referred those interested to a paper read about two years ago by Mr. Mossley, on incandescent lighting, also to another given by Mr. S. Meunier, of Stockport, at Halifax some three or four years ago. The speakers, although differing on the question of how many mantles per burner per annum were required, agreed in the main that the life of incandescent mantles depended largely upon the number of lighting hours, the description of burner, the type of torch in use, the roads and the amount of traffic in the district, the utilization of anti-vibratory or stationary fittings, the carefulness of the lamp-lighter in cleaning and lighting, and the consumption per hour.

"*What is the most effectual reply a gas company can make to an electrical undertaking that issues hand-bills stating that electricity is the cheapest, cleanest, and most convenient form of lighting and power?*"

Mr. Alsop said that this query was a far-reaching one, and could be treated from many standpoints, according to the district, class of customer, candle power of the gas, &c. Again, much depended upon the personal feelings of the engineer and upon the *personnel* of the directorate of the gas company. Under these circumstances, he contented himself by simply indicating some line of action that might be followed. He suggested the issue of a hand-bill calling attention to the mis-statements about electricity being "the cheapest, cleanest, and most convenient form of lighting and power;" following this up by a statement of facts which every gas engineer had at his finger ends. After the hand-bill had been circulated, a shareholder of the gas company might write to the local weekly paper commenting upon the two hand-bills, to which a director or official of the gas company could reply the following week, putting forward a good case for gas. If the electrical people could by any means be drawn into the discussion, the engineer of the gas company could then appear upon the scene and "smite the electricians hip and thigh." The longer the controversy could be maintained, the better for the gas company. It would be an advantage if copies of the leaflets issued by the "JOURNAL," or some reprints of Mr. Goodenough's circulars issued by the Gaslight and Coke Company, were distributed in the district. This would have a tendency to educate the general public; and if the gas company deemed this an opportune moment, they could advertise at the same time that they had decided to give the public the advantage of a special price for gas used for heating and power—thus taking a leaf out of the electrician's book. Then the discount-loving public would rally round the gas company, and the issuing of the electricians' hand-bill, with its many terminalogical inexactitudes, would have been a blessing in disguise to the gas company.

Back-pressure in purifiers.

The following was another query: "I noticed the back-pressure of my purifying plant increasing, so I changed the dirty vessel, thinking the oxide had got baked or solid; but the back-pressure kept increasing, although all the vessels were clean. What would be the best means of locating the cause under the circumstances and keep your gas making going?" A member, in reply, said that one day being troubled with back-pressure in his No. 3 box, which was the dirty one, he changed in the usual way and commenced to empty the oxide. However, the pressure still increased; and he then reversed the centre-valve, passing gas through No. 3 box, but empty. So that he could examine No. 4 box, the flange on the outlet was removed, water was found and run off, and the pipe cleaned up to the centre-valve. Here was found the cause of the trouble—a piece of leather, which was over the syphon pipe. How did it get there? It was the custom to empty a few buckets of water down the outlet each time a vessel was changed, and the leather must have been in one of the buckets and escaped the notice of the man in charge. Mr. J. Taylor said it sometimes happened that the middle box of a set of three got caked, and thus caused a rapid increase of back-pressure without the first box caking. This might be due to the oxide in the second box being fairly old and well spent, while that in the first box was in better condition. He had had the first box in a set caked before it was possible to get the off box emptied. They had to make a clear passage in the partially emptied box, put the cover down, and turn the box on. The gas was thus sent through two properly-charged purifiers, which, being in good condition, effectually removed all sulphuretted

hydrogen for the time, and then had a clear passage through what was practically an empty box. This lasted till the other purifier was emptied and recharged, when the valve was again changed and ordinary working resumed. The only way of locating cases of this kind, the speaker added, was to have a differential pressure-gauge coupled to the inlet and outlet of every purifier, or, as an alternative, a single gauge coupled to the various inlets and main outlets with a cock on each pipe, so that the pressure at any portion of the purifying plant might be at once obtained. The cost of a few gauges would not be felt by the smallest gas-works; while the information that they gave in many cases would save considerable trouble, anxiety, and actual loss.

"*What are the effects of the admission of steam to a regenerator furnace?*"

This was the last question on the list. The following answer was made: When steam is admitted into a regenerator furnace, it is decomposed in passing through the incandescent coke, forming carbon monoxide and hydrogen as follows: $H_2O + C = CO + H_2$. In this decomposition, a large amount of heat is absorbed, whereby less heat is generated in the producer. This loss of heat is a little more than balanced by the quality of the producer gas formed, which is richer in combustible gases than when air only is used; the percentage of carbonic oxide being increased, which, together with the hydrogen formed, increases the calorific value of the gas. But the chief advantage that can be claimed for the admission of steam is that it prevents the formation of hard clinker in the furnace, thereby facilitating the maintenance of high heats, and making the operation of clinkering less arduous, with less wear and tear on the furnace lining and fire-bars. These results may be obtained, in properly-designed furnaces, from the steam generated from the water in the ash-pan, and also from the stream of water impinging on the drip plates and fire-bars, making the setting independent of an outside steam supply, and thus economizing fuel.

The usual vote of thanks brought an instructive afternoon's discussion to a conclusion.

Water-Works for Buenos Ayres Suburbs.

It will be seen, from an advertisement which appears elsewhere, that the Province of Buenos Ayres Water-Works (Construction) Syndicate, Limited, which has been formed, with a capital of £224,000, divided into 44,000 ordinary "A" shares of £5 each, and 88,000 ordinary "B" shares of 1s. each, for the construction of works for furnishing a supply of water to certain suburbs of Buenos Ayres, are inviting applications for the whole of the ordinary shares, each of which will give the subscriber the right to apply for, and have allotted to him, one "B" share. The subscriptions for the "A" shares are payable 10s. on application and a like amount on allotment; and the remaining £4 will be called up as required for carrying out the works. It is estimated, however, that only £2 will be needed during the first nine months of construction. The "B" shares are to be paid for on application. It is stated in the prospectus that out of the profits which the Syndicate shall determine to distribute each year the holders of the "A" shares will be first entitled to a non-cumulative dividend of 7 per cent. per annum on the amount paid up, and that the surplus profits will be divided equally between the two classes of shareholders. The "A" shareholders will also have a preference as regards capital over the "B," and after repayment of the capital paid up on both classes of shares will be entitled to one half of the surplus assets; the holders of the "B" shares being entitled to the other half. The prospectus further states that the South Barracas Gas and Coke Company, Limited, the vendor Company and the promoters of the Syndicate, caused application to be made to the authorities of the Province of Buenos Ayres for a concession for the supply of water to the districts they supply with gas; and in September, 1905, a law was passed granting the concession. The contract for the sale of this provides for the payment to the vendor Company, with interest, of the sums they shall have actually expended or become liable for, and for the allotment of 33,000 "B" shares fully paid up. The Directors of the Syndicate are Mr. J. Conrad im Thurn, a Director of the Buenos Ayres (New) Gas Company, Limited, and of the South Barracas Gas and Coke Company, Limited; Mr. Ross Pinsent, a Director of the above-named Companies and also of the Consolidated Water-Works of Rosario, Limited; and Mr. Arthur Telford Simpson, M.Inst.C.E., the Chairman of the West Surrey Water Company. The subscription list will close on or before to-morrow.

At the monthly ballot for membership of the Institution of Civil Engineers last Tuesday, Mr. W. J. Atkinson Butterfield, M.A., F.I.C., the Secretary to the Metropolitan Gas Referees, was elected an associate.

Mr. G. C. Lloyd, the Secretary of the Institution of Electrical Engineers, has been appointed Secretary of the Iron and Steel Institute, in succession to the late Mr. Bennett H. Brough. Mr. Lloyd was formerly Mr. Brough's Assistant.

The partnership which has subsisted for many years between Messrs. E. H. Stevenson and E. K. Burstal will be terminated by mutual consent at the end of the current year, and the practice continued by Mr. Stevenson at the present offices in Parliament Street. Mr. Burstal will not give up practice, and for the present will use the same offices, by arrangement with Mr. Stevenson.

YORKSHIRE JUNIOR GAS ASSOCIATION.

The First Ordinary Meeting of the Association for the current session was held on Saturday afternoon, at the Leeds Institute, the PRESIDENT (Mr. H. Butterfield) being in the chair. There was a good attendance of members.

Before entering upon the special business of the meeting, the President announced that Lady Livesey had acknowledged and thanked the Association for, their letter of condolence with her in her trouble.

The PRESIDENT said he would remind the members that carbonization methods were very much to the fore now, and that the whole question was in the melting-pot. What would finally emerge as the recognized best method of working—horizontal retorts, inclines of 32° or those of 45° slope, vertical retorts, or coke-oven chambers, or even some new and at present unexpected development or modification of these—it would be difficult at present to conjecture. They naturally wished to keep abreast of these developments and in touch with conflicting theories and claims; so that papers dealing with some aspect or other of the case were specially welcome to them. He had great pleasure, therefore, in formally introducing one of their fellow-members, Mr. Atley, of the Whitwood Chemical Works.

Mr. W. WALKER ATLEY then read the following paper.

COAL CARBONIZING FOR BYE-PRODUCTS.

The subject of this paper is rather an unusual one to bring before a Society of Gas Engineers; gas, which is of the utmost importance to the gas manager, being of secondary consideration at works carbonizing coal for residuals, the principle of which is the production of coke, benzol, sulphate of ammonia, and tar.

Prior to 1862, all coke produced for metallurgical purposes was produced in coke-ovens on the beehive principle, and the bye-products allowed to go to waste. Since that date, the old type of beehive oven is being gradually superseded by the recovery coke-oven. From these ovens, the gases from the hydraulic main are exhausted through coke-scrubbers externally cooled by water, from which is obtained the tar and ammoniacal liquor; the gas being finally employed for heating the ovens in the form of bunsen burners. The Germans and Belgians very quickly took up the problem; and about 1880, the coke-ovens patented by Carvés were in extensive use on the Continent, while we in our own leisurely way only commenced to take up their use in about 1882. Some twenty years ago, coal washing was introduced, and is very generally employed at the present time. There are several systems in vogue; but they all have the same objective—*i.e.*, reducing the amount of ash in the coal by eliminating the shale and dirt. Smudge or small coal can be freed of ash, by washing, to the extent of 10 per cent. By this means, the ash in coke is brought down to 5 or 6 per cent. The great saving of fuel brought about by the introduction of these ovens is a point of much economic value to the country. The latest development in the carbonization of coal for bye-products is the patent of Mr. Thomas Parker, exploited by the Coalite people, the principle of which is the carboniziation of coal at low temperatures with the aim of producing smokeless fuel.

The first experiments in England with a view to the extraction of benzol from coal gas were conducted in 1882, when for many weeks about 200,000 cubic feet per day of Manchester gas were used. The station-meter for measuring the gas used was placed in an empty house some distance from where the experiments were being carried out; but such were the vague ideas of gas in those days, and the belief that an explosion was more than probable, that when the people in the district saw the meter being fixed, several houses were rendered vacant, and remained so during the whole of the period the station-meter stayed there. The price of benzol in 1882 was about 4s. 6d. per gallon; whereas to-day benzol rectifiers would be glad to see the price of their commodity at 9d. The experiments carried out with the Manchester gas were so successful that a profit resulted even on this small scale; and it induced several enterprising people to put down carbonizing works in different parts of the country, many of which were erected relying altogether on benzol as the chief residual. You will readily realize that, owing to the great depreciation in the value of benzol, this product is no longer the main factor to be considered; coke now being the most important bye-product.

The recovery of benzol from coke-oven gases began in Germany about 1890; and shortly afterwards ovens for this purpose were erected in this country. Within the last five years, the development of the bye-product coke-oven has been most conspicuous in the North of England. This explains itself by the fact that it is in this district that the coke is mainly consumed for iron smelting. The gases from coke-oven plants are utilized in several places for illuminating purposes after enrichment, and also for generating power. There is, however, a considerable quantity of the gas so produced being used for raising steam, which I consider might be distributed to towns in the neighbourhood by means of high-pressure mains into the gas companies' holders. Gas managers may, under the aforementioned conditions, be able to purchase gas at a low figure. This, I think you will agree, is favourable, especially as capital costs are reduced to such a small amount, and not crippled with standing charges.

The greatly increased production of sulphate of ammonia is

mainly due to the rapid erection of recovery coke-ovens; and the following figures give us some idea of the extent of manufacture:—

—	1900.	1907.	Increase Per Cent. from 1900-1907.
	Tons.	Tons.	
Gas-works	142,419	165,474	16·17
Coke-ovens, including carbonizing works and producer gas	17,081	75,445	341·69
Total production . . .	213,726	313,281	46·58

It is interesting to note that, of the total of 313,281 tons produced in 1907, no less than 230,537 tons, or 73·58 per cent., were exported. We have to thank our friends the Japanese for giving the English farmer the lead in this respect.

This afternoon I wish to treat more especially on the methods employed at carbonizing works making soft coke. In the particular works with which I am now associated, the process is very similar to ordinary gas-works' practice, with the exception that, instead of storing the gas produced in holders, it is conveyed by a return main, after leaving the washing plant, to generate heat under the retorts and steam-boilers. A portion is also bye-passed through four oxide purifiers, and measured by a rotary station-meter, to a local privately-owned gas-works. A portion of the gas so delivered is used for engines of various sizes—20 to 150 B.H.P.—generating electricity, &c.; and the rest is enriched by means of benzol to 18-candle power for lighting the district. The gas as received at the gas-works has an illuminating power of 10 candles; and this requires 0·18 gallon of 90 per cent. benzol per 1000 cubic feet to enrich it to 18 candles. Debenzolized gas from coke-ovens and carbonizing works ranges from 500 to 610 B.Th.U. per cubic foot; so that with the ever-increasing popularity of the incandescent burner, enriching of the gas will, in my opinion, soon be a thing of the past.

The coal chiefly used is the smudge or smalls from the ordinary coking qualities, which in Yorkshire is the well-known Silkstone seam, and has the following analysis: Moisture, 2·82 per cent.; sulphur, 1·85 per cent.; volatile matter, 31·03 per cent.; fixed carbon, 55·13 per cent.; and ash, 9·17 per cent. The coke from this coal contains: Moisture, 4·27 per cent.; sulphur, 1·51 per cent.; volatile matter, 1·52 per cent.; fixed carbon, 82·97 per cent; and ash, 9·73 per cent.

The chief bye-product of to-day is obviously the coke, instead of being benzol, as before mentioned; and you will notice there is a yield of 11·25 cwt. of saleable coke per ton of coal carbonized. As previously stated, the gas is partly used for heating the retorts, which is accomplished by means of 2-inch bunsen burners fixed just above the level of the fuel in the furnace. This ensures regular and efficient heating, with a minimum of labour and coke consumption, for maintaining the heats at 1080° to 1100° C.; and 10·4 lbs. of coke and breeze are required per 100 lbs. of coal carbonized.

The gas after leaving the retorts passes through annular and water-cooled tubular condensers to the exhausters, and is then scrubbed in washers and tower scrubbers to eliminate the ammonia. From the ammonia scrubbers, the gas is passed through a Livesey washer and two tower scrubbers down which is sprayed creosote oil—the specific gravity ranging from 1·020 to 1·060. The creosote oil readily absorbs the lighter hydrocarbons from the gas—viz., benzol, toluol, naphtha, and a portion of the naphthalene. These products are the chief illuminating constituents of ordinary town gas. The gas is now used for heating or power purposes in the carbonizing and chemical works generally.

The products obtained from one ton of Yorkshire silkstone smudge coal are—

Rectified products obtained from gas	2½ to 3 gallons of a mixture of:— 90 per cent. benzol 90 per cent. toluol Solvent naphtha.	
	Tar	10·33 gallons
	Sulphate of ammonia	30 lbs.
Saleable	Coke	9 cwt.
	Breeze	2·25 cwt.
	Total . . .	11·25 cwt.

Working up the Bye-Products.

The ammoniacal liquor is worked up into sulphate of ammonia in the usual way with continuous stills and open saturator. The waste gases from the saturator are decomposed in a Claus sulphur recovery plant from which 69 lbs. of 75 per cent. sulphur per ton of sulphate of ammonia made are obtained. The creosote containing the absorbed benzol, or saturated oil as it is technically termed, is subjected to continuous distillation to obtain the crude benzol. The oil, after cooling, is again used in the scrubbers. The crude benzol so obtained, however, contains lighter fractions of the creosote oil that distil over along with the water which is always present in the scrubbing oil to the extent of 2 to 3 per cent. This crude benzol is, after further treatment, redistilled to get rid of the lighter fractions of creosote oil. The distillate of B.O.N. is now washed with concentrated distilled sulphuric acid of 1·845 sp. gr., to abstract a portion of the sulphur compounds—mainly thiophene (C_4H_4S) and tarry matter—then with water, and finally with caustic soda to eliminate the water and neutralize any acid that may be present in the benzol. The washed B.O.N. is now fractionated by dry steam; the receivers being changed for the different products according to their points of distillation.

Pure benzol and toluol are prepared by again washing the 90 per cent. grades and re-distilling. So accurately do the modern benzol fractionating plants do their work. that all the benzol will distil over within $\frac{1}{2}$° C. The 90 per cent. benzol (C_6H_6) is very extensively used for carburetting coal gas and for the manufacture of nitrobenzol, which is then reduced by scrap iron and crude hydrochloric acid forming aniline—the starting point of a great variety of colours in the dyeing industry. Motorists have found in this benzol a splendid substitute for petrol. Containing a greater percentage of carbon, it is much more economical than petrol. The great difficulty in regard to the development of the uses of benzol is that it is so much richer in carbon than petrol, and therefore requires more air to give complete and efficient combustion of benzol in the motor. Were it in more general use, no doubt motor-car engineers would see to this matter, and have it remedied in all new cars put upon the market.

The production of commercial 90 per cent. benzol in this country has increased very rapidly of late; and the present annual output may be taken at 4,000,000 to 5,000,000 gallons, of which one-third goes for export. Should all the benzol be extracted from the gases of recovery coke-ovens in this country, it is estimated that 8,000,000 to 10,000,000 gallons could be produced annually. A gallon of benzol contains 163·380 B.Th.U. of heat; and a gallon of petrol, 157·142 B.Th.U. It therefore follows that less storage capacity is required for benzol than petrol.

Ninety per cent. toluol (C_7H_8) is also largely used in the manufacture of dyes. Solvent naphtha is in demand for dissolving india-rubber in the manufacture of waterproofs, &c. Heavy or burning naphtha is used to make quick-drying varnishes. It is also mixed with paraffin for burning in flare-lamps by showmen, &c., hence its name.

Tar Distillation.

Tar is distilled in wrought-iron stills which usually have a capacity of 10 to 20 tons. A ton of average quality tar yields:—

90 per cent. benzol	1·93 gallons
90 per cent. toluol	0·45 ,,
Solvent naphtha	0·9 ,,
Heavy naphtha	0·2 ,,
Ammoniacal liquor	5·56 ,,
Creosote oil (free from crystals)	44·3 ,,
Naphthalene	144·6 lbs.
Carbolic acid	1·79 gallons
Cresylic acid (distilled)	2·65 ,,
Pyridine bases	0·17 ,,
Heavy oil	29·6 ,,
Anthracene	9 3 ,,
Pitch	9·86 cwt.

During the distillation, the receivers are changed when the specific gravity of the distillates has reached a certain point. The finish of the distillation is assisted by live steam, which is admitted to the still by a perforated coil fixed at the bottom. This drives off the remaining heavy vapours from the still, and prevents them cracking-up into permanent gases, which would happen if they were not driven off by the steam.

The pitch is allowed to remain in the still for 9 to 10 hours, and then run into the pitch coolers, where it is mixed with oil to bring it up to the required degree of hardness or twisting point. The pitch is next run into the pitch-beds, where it solidifies and is broken up with picks when required for delivery. The crude tar naphtha is agitated with caustic soda of 1·075 sp. gr.

The sodium carbolate formed is allowed to settle, and run off into a lead-lined tank, and neutralized with carbonic acid gas or sulphuric acid, when the crude carbolic acid separates out. Pure carbolic acid crystals are made by distilling the crude acid. Carbolic acid is used extensively in the manufacture of disinfectants, antiseptics, and picric acid. The naphtha is again agitated with caustic soda of 1·125 sp. gr. for extracting the cresylic acid. This is then run off into another lead-lined tank and neutralized. The cresylic acid thus obtained is of too crude a character to be readily saleable, so it is distilled; the distillate being known as refined cresylic acid.

Cresylic acid is largely used for disinfecting purposes. The carbolic oil fraction is treated similarly to crude naphtha for the recovery of the carbolic and cresylic acids. Creosote oil is employed chiefly for preserving timber and burning in "Lucigen" lamps. Naphthalene (C_{10} H_8) is employed in the colour industry chiefly, and heavy oil in the manufacture of lamp-black for paint making, and also as a lubricant. Anthracene (C_{14} H_{16}) is the starting point in the manufacture of alizarin—the colouring matter employed in producing turkey red. Pitch is extensively used for making patent-fuel briquettes, by mixing with small coal in the proportion of from 8 to 10 per cent. of pitch, according to the quality of the coal. Now that the prices of tar and pitch are so low, the developments in the way of tar macadam should be great. Then we have the question of tar-spraying roads to mitigate the dust nuisance. Experiments have proved that tar acts very efficiently in this respect.

By carefully considering the relative quantities of the distillates from these tars, you will readily see how much more valuable a gas-works tar is to the tar distiller than the tar obtained from coke-ovens. This in great measure is due to the absence of the dip-pipe on the hydraulic mains of coke-oven plants, causing the exhausters to draw into the mains along with the gas a

Gas-Works Tar (*Sp. Gr.* 1·160, *Yorkshire Coal.*)

Product.	Temperature of Distillation Deg. C.	Percentage on Tar by Weight.	Gallons per Ton of Tar.	Sp. Gr. of Distillate.
Naphtha	75–155	7·3	14·0	0·952
Water	75–155	3·5	7·3	1·015
Carbolic oil	180	12·2	23·4	1·030
Creosote oil, 1st	188	6·1	11·7	1·040
,, ,, 2nd	216	12·2	23·4	1·050
Anthracene oil	266	11·4	21·8	1·120
Pitch	..	46·5	9·3 cwt.	1·200

Twisting-point of pitch, 137° Fahr.

Coke-Oven Tar (*Sp. Gr.* 1·150, *Yorkshire Coal*).

Naphtha	75–155	7·0	13·60	0·930
Water	75–155	2·4	4·60	1·015
Carbolic oil	188	12·8	24·80	1·030
Creosote oil, 1st	200	5·5	10·60	1·040
,, ,, 2nd	232	12·4	24·00	1·055
Anthracene oil	266	7·2	13·90	1·105
Pitch	..	53·8	10·76 cwt.	1·200

Twisting-point of pitch, 137° Fahr.

Coke-Oven Tar (*Sp. Gr.* 1·165, *Durham Coal*).

Naphtha	..	0·792	1·78	0·950
Water	..	2·376	5·34	1·015
Creosote oil	..	18·413	39·13	1·060
Anthracene oil	..	23·958	48·91	1·110
Pitch	..	53·861	10·77 cwt.	1·200

Twisting-point of pitch, 136·4° Fahr.

quantity of free carbon particles; and also largely to the fact of the hot zone above the charge breaking up the lighter hydrocarbons into lamp-black or other bodies.

In conclusion, I would like just to draw your attention to the developments that are to-day taking place in the methods of carbonizing coal. There are ordinary horizontal retorts, with the latest machinery; inclined retorts of various designs; vertical retorts; and last, but not least, recovery coke-ovens. When one thinks of the various benefits that are claimed for the respective systems, it makes one realize the difficulty that engineers of large works have to contend with.

[Mr. Atley had a very large and interesting exhibit, covering the complete range of all the products of his works (excepting, of course, the gas), in the crude state, in the different stages of rectification, and the various grades as put on the market. These were referred to and described as the reading of the paper progressed, and were thoroughly inspected at the close by the members present. At the same time he had on the lecture table a quantity of washed benzol undergoing rectification, being distilled from a flask fitted with a fractionating column, &c. The wall, too, was covered with diagrams of the tar-distilling and the oil-rectifying plant, and sheets of statistics. As the paper was of a type that invited questions rather than formal discussion, the queries were answered as they were put.]

Mr. W. Cranfield called attention to the disparity between the figures given of the amount of ash in the coal and in the coke —9·17 per cent. in the former case and 9·73 per cent. in the latter. If these represented average samples, or the average of the tests, one would expect the latter figure to be about 13 per cent., so as to maintain the usual ratio between the two. Anyhow, coal containing 9·17 per cent. of ash would not yield coke with only 9·73 per cent. of ash. They had been given the calorific values of benzol and petrol, but could Mr. Atley furnish any data as to the comparative amounts utilized, seeing that the familiar odorous trail of the motor-car contained decomposition products of the oil used, and therefore represented a loss of part of the calorific contents of the benzol and petrol. Was this loss equal in the two cases? Mention had been made of the use of carbon dioxide for decomposing the sodium carbolate solution and liberating the carbolic acid. Was its use instead of sulphuric acid at all usual, and was it adopted at Mr. Atley's works? He had been much interested in the description of the preliminary heating of the tar in a superheater, and wished to know if all the light oils were there expelled from the tar.

Mr. Atley admitted that the ash contents given could not represent those of a sample of coal and of coke made from part of the same sample. All their coal came from the same seam, but it naturally varied greatly; hence the disparity of the figures given. He had no data of the extent to which benzol and petrol varied in the amounts utilized in motor-cars; but it was found that, on an average, benzol gave 25 per cent. higher efficiency than petrol. The smell from benzol greatly depended on the extent to which it had been washed; and it was the more pronounced and objectionable the more sulphur compounds it contained. Their motor benzol contained from 90 to 150 grains of sulphur per gallon. At his works, they cracked the sodium carbolate solution with sulphuric acid, utilizing the acid that had already been used in washing the light oils; but on some works carbon dioxide was specially generated for the purpose and bubbled through the liquid. All their light oils were obtained from the tar during its preliminary heating; and after it passed into the still they began at once to collect the creosote distillate.

Mr. Booth referred to the sulphur recovered by means of the Claus kiln, which was stated to be 75 per cent. sulphur, and wished to know what the other 25 per cent. was. In the two Claus kilns with which he had had to deal, they found no difficulty in getting 90 per cent. of sulphur. They then had 2 to 3 per cent. of ash; and the remainder was water and volatile cyanides. As regards the smell from motor-cars, this was far more likely to be due to the decomposition of the cylinder lubricating oil than of the benzol or petrol, especially if it occurred immediately on re-starting the car. If petrol or benzol smells were perceptible, it might be from a deficiency of the air admitted or an excessive flow of the spirit; but it certainly meant bad driving.

Mr. Atley replied that their recovered sulphur contained on an average about 12 per cent. of water; and a good deal of calcium sulphate formed from the lining of the kiln. The floor was of concrete in which pipes were embedded, from which at intervals they drew off water that had drained into them.

Mr. Booth spoke of kilns that had gutters arranged in their concrete floors, and these drained to a seal-pot inside the kiln. The amount of water deposited largely depended on the size of the kilns and the rate the gases travelled through them.

Mr. Shepherd inquired if Mr. Atley had any data concerning the distribution of cyanides in coke-oven liquor, or any evidence about the occurrence of alkalinity in the waste gases from a Claus kiln. The suggestion had been made that this may arise from hydrocyanic acid being decomposed in the kiln, with the consequent formation of ammonia.

Mr. Atley said he had no figures with him bearing on any cyanides either in gas liquor or the sulphate plant's waste liquors. They sometimes found ammonium compounds in their sulphur. This they were inclined to attribute to temporary alkalinity of the sulphate saturator; but they had not investigated the matter. In reply to another question, he stated that their devil-water was run into the tar-well for the sake of recovering the pyridine in it.

Mr. Roberts asked if their coke was suitable for household purposes, and if any was so sold.

Mr. Cranfield inquired whether any experiments had been made with charges nearly sufficient to fill the retorts.

Mr. Atley replied that their coke was a soft coke, practically the same as that from ordinary gas-works. They were unable to charge retorts nearly to fulness, as they had no ram, but West's drawing machine with its rake. Their usual charge was about 5½ cwt., which was carbonized in 4½ hours. They experimented somewhat in the direction of Coalite, with low heats and more prolonged heating. Their usual make of coke was 800 tons per week; and it mostly went direct to the Continent. In answer to further questions, about the gas supplied in bulk to a neighbouring small works, as to where it was enriched and how purified, he stated that the apparent inconsistency of first removing benzol from the gas and then carburetting again with the recovered benzol, was explained by the fact that much of the de-benzolized gas was consumed under their own retorts, and that even of what was sold much was at once used unenriched in a large gas-engine. Some places had had much trouble when attempting to distribute coke-oven gas, because of its rapid and serious variations in quality. They sent out only de-benzolized gas, and that of a pretty uniformly low grade—viz., about 10 candles, though its calorific value was 500 B.Th.U. and upwards. They had a governor on their "spent" gas main, weighted to give a certain outlet pressure on the main going to the gas-works. All gas in excess of what was needed to give this pressure, backed-up along a branch main, and went to their own retort-settings as fuel. What arrived at the gas-works passed into a holder; and the part not needed for power was carburetted with benzol in a Maxim carburettor continuously during the twelve hours of the day time, and delivered into two smaller holders, which then distributed it among the consumers. About 110,000 cubic feet of gas was daily sent to the gas-works in ten hours; so that no night men were wanted on the works except to attend to altering the weights on the governor. A small installation of single retorts was provided as a stand-by, in case the supply from the chemical works was interrupted for any prolonged period. Enrichment needed 0·18 gallon of 90 per cent. benzol to bring 100 cubic feet of gas from 10 to 18 candles. The gas destined to pass to the gas-works was purified from sulphuretted hydrogen on the chemical works, in the usual way, by means of oxide.

A vote of thanks to Mr. Atley, and to his colleague Mr. Millom, who had assisted in various practical ways, was proposed by Mr. S. W. Shepherd, seconded by Mr. H. Smith, and suitably acknowledged.

Alderman Thomas Richardson has been elected by the Directors of the Newcastle-upon-Tyne and Gateshead Gas Company to fill a vacancy on the Board.

In the course of an article on "Co-Partnership and Unemployment," by Sir Benjamin C. Browne, in the current number of the "Engineer," he refers to the South Metropolitan Gas Company's scheme, which he says might be looked upon as one subject, with modifications, to general adoption. But he adds: "Of course, we can never know how much of its success was due to the extraordinary charm and personal influence of Sir George Livesey, to whom all his men and officials were devoted, and who certainly had the most extraordinary power of influencing other people to do what he thought right."

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

A Meeting of the Western District Division of the Association was held on Saturday evening, in the Technical College, Glasgow —Mr. A. H. WHITELAW, of Glasgow, the President, in the chair. About fifty members were present.

The PRESIDENT, in opening the proceedings, said he desired to express, on the members' behalf and on his own, their high appreciation of the appointment of Mr. Bell, of Airdrie, as Gas Manager at Kirkintilloch. They were always glad to see, not only Past-Presidents, but ordinary members of the Association getting appointments to positions of responsibility; and he was sure it must be a great pleasure to everyone of them to know that their friend Mr. Bell had obtained his well-deserved promotion.

Mr. J. M'GHEE (Glasgow) then addressed the meeting on the subject of

HEATING AND LIGHTING.

Commencing with the application of gas as a fuel in our own workshops—as I think every gas manager should do, if he desires to carry conviction to the minds of his customers—we have fully 100 bolt-heating, lead-melting, boiling and other types of furnaces in daily use. Into our fitting department, a very large quantity of copper piping, from 3 to 5 feet in length, is returned daily, twisted into many shapes. This tubing is straightened and softened, and all the old solder melted off again by the simple furnace that you see in the diagram [exhibited]. The legs of it are made of 3-inch malleable iron pipe supporting a fire-brick top. A longitudinal opening is covered by two fire-brick shutters, which are adjustable to varying widths; and the old solder and lead are caught on a sheet-iron tray below. There is a double row of burners under separate control, and which are angled to cause the flame to play into the centre of the opening. A similar furnace, modified to suit, is used for burning grease, &c., off the cooking-stove burners which are brought in for repair. For washing the paint and dirt off meters in course of repair, we have several rectangular tanks, each about 60 gallons capacity. These tanks, containing a certain proportion of caustic soda and water, are kept at a suitable temperature—about 200° Fahr.—by dome circulators. These are all under blast pressure of about 10 inches. In the stove-repairing department, the various parts, after coming from the cleaning-tanks are dried in a large sheet-steel oven, measuring 6 ft. 6 in. high and 4 feet square, double cased and jacketed with slag wool, and fitted with movable shelves. The oven is kept to the required temperature by means of two ordinary atmospheric tube burners, under separate control, slightly raised from the floor. A flue with a damper is provided. An oven of this type might be utilized for many purposes, such as tobacco-drying, japanning, &c.

While dealing with ovens, it might be useful to recall the interesting experiments made by Mr. Fletcher. It was found that by allowing 1 cubic foot of gas to every square foot of external oven surface, the following increases in the temperature of the oven over the atmosphere of the room were noted:—

	Deg. Fahr.
Without jacket, and burner beneath	120
" " " inside	250
Jacketed with slag wool on top and sides, and burner inside .	430

An externally heated oven is more uniform than one with inside burners; and for goods requiring a particular temperature a jacketed oven with external burner is best. Dampers should be fitted to the flues, to control the air passing through, so as to have complete oxidation of the gas.

In the locomotive and other engineering shops in our area, gas as a heating agent is gradually taking its place in the working economy of these establishments. The method used in the Caledonian Railway locomotive shop for expanding locomotive tyres prior to their being fitted to the rims of the wheels, is to employ burners that are simply 1¼-inch malleable iron tubing perforated with $\frac{1}{16}$-inch holes. The gas is mixed with air-blast under a pressure of about 8 inches, supplied from a Sturtevant fan. As the tyres vary in size up to about 8 feet in diameter, burners of different sizes are used. They are provided with an oval flange and two bolts centrally on two sides, with different lengths of shanks or necks to suit. The workmen can in a very few minutes disconnect and substitute the size wanted. These tyres are brought to the heat required in about 20 minutes. Since gas was adopted for this purpose, the labour of 18 men has been saved who were formerly employed hauling tyres backwards and forwards from the old coal furnaces. The burners are fixed in shallow circular pits, and the tyres are lowered and raised by a crane. In the building together of the crank-shafts, webs, &c., of the locomotives, rings of jets play in a similar manner on the outside of the casing to be expanded, while a burner on a swing joint, with a number of jets playing from its centre, is lowered into the interior. A muffle furnace is used to temper special tools, taps, reamers, &c.—a job they can now do with a precision and exactitude unattainable hitherto with the coal fire.

Remembering the very important part tubes play in the construction of the modern locomotive fire-box, it was very refreshing to see the good consumption of gas in this department for brazing the brass ends to the copper tubes, which was done in a very clean and expeditious way. The brazing furnaces are formed of cast-iron casings lined with firebrick. The gas under blast is admitted at three different points in the body of the furnace, so that the flames meet centrally, and impinge on the joint that is being brazed. In this operation the tubes are suspended vertically in the centre of the furnace. Several other large establishments have introduced Fletcher's muffle furnaces, and are using them under blast pressures varying from ½ lb. to 1½ lbs. per square inch. On inquiring of one or two of the managers of these places as to cost, &c., I was told the greater efficiency obtained put the question of cost out of court. In Singer's large factory at Kilbowie, they recently built a furnace, and fitted it with a number of Allday and Onions' patent burners. The blast, at a pressure of ¾ lb. per square inch, being heated previous to entering the burners by passing through a fire-brick chamber heated by the gas impinging on its side and across the top, gives them the very high temperature of fully 2000° Fahr. Heating the air previous to mixing with the gas is a source of great economy, and very much higher temperatures can thus be attained; for 2600° Fahr. (1427 C.) can be reached, which is a much higher temperature than is required for the air-hardening of any make of high-speed steel. The floor of this furnace is on an inclined plane, and the steel bars slowly travel down to the lower end, where they are then lifted by the workmen and bent as desired. These bars are about 4 feet long, and generally about 11-16ths inch thick.

The greater heating power of town gas has also been recognized in more than one of the large shipbuilding yards on the Clyde. Some of these possess very large low-grade gas plant of their own. In these places, it is customary, for expanding or annealing purposes on large shafting, to build a fire-brick casing round the part to be so treated; and to this casing their own gas is conveyed from convenient stand-pipes by flexible tubing with special nozzles. These firms are now also conveying the town gas as a powerful auxiliary. It is found to be cheaper to convey the fuel to the job than to transport the job to the furnace.

Another very interesting application of gas is for muslin singeing. There are several of these gassing frames, as they are called, in the city. The muslin is drawn rapidly over revolving rollers, across a narrow, highly polished iron surface, fitted into a sheet-iron casing to which a fan-pipe is attached. Above this polished surface a double row of very fine needle-like gas-jets are burning, jets downwards. There are two long slits in the polished face, into which these jets are drawn when the fan is set in motion. The muslin is then drawn quickly and smoothly through the flame, thus ridding it of all superfluous loose material, and leaving a finely finished surface. A large consumer in the glass trade, partly with a home-made furnace of his own design, fitted with atmospheric burners, is successfully fixing the enamelled printing of transfers and advertisements on carafes, tumblers, glass paper weights, &c. The bottom of this furnace is formed of iron trays, placed on a conveyor chain; the glassware being placed in a shallow bed of powdered gypsum, and the trays passed through as desired. The gas is deflected from the fire-brick top, thus enveloping the glasses in a very strong and steady heat. The pressure is kept constant by a governor on the main supply-pipe close to the furnace.

Turning now from the industrial uses of gas as a fuel, let us consider it briefly for domestic and public heating. Into the question of hiring or hire-purchase of gas-fires, radiators, &c., I do not propose entering. Within recent years, the leading makers of these appliances have put good sound mechanical ingenuity and practical scientific training into their construction. The result is that the selection of suitable fires is now mostly a question of individual taste, combined with a proper knowledge of the heating capacity required. A very good rough rule for the size of fire needed is 1 inch of fire-opening for every foot of width; and it is advisable to err a bit on the big side. Another good rule to follow is to have the fire with as much fire-brick as possible in its construction, and as little ironwork. Mr. Brearley, in his now well-known gas-fire tests, only found 5 out of 24 showing traces of carbonic oxide; and in no case did it exceed 0·35 part in 100,000 parts, which was a very flattering tribute to the makers. Duplex burners I consider a much neglected boon. Gas-fires, when they are turned down low, when a room gets too warm, have a very dead and depressing appearance which is not apparent when part of the burner is kept fully alight by a duplex burner.

It is impossible to lay down hard-and-fast rules for fixing fires. Down-draught can very often be cured by carrying 3 or 4 feet of flue-pipe, with a cap on top, up the chimney. If the flue-pipe is slightly reduced in diameter approaching the cap, it will be even more effective. A fire-place lined with sheet iron, and the flue fitted practically air-tight, is a mistake. It frequently results in the fire being chilled by too great a volume of cold air being drawn over the surface of the fire, with a corresponding loss of heat up the flue. In a case of this kind, an opening must be made into the flue. This, again, begets the question of the desirability or otherwise of fitting dampers in the fire-flue, or the flue-pipe itself. While favouring the idea, the fact remains that the dampers would very often be found shut when they ought to be open, and *vice versâ*. Burners and fire-bricks fitted into the existing fire-places are most in demand, owing to a very natural desire on the part of people to retain their good grates. This is certainly the most expensive and least satisfactory method of heating. The conditions vary so much—size of the fire-place, height, and flue openings—that it is advisable, where possible, to keep the same men at this work, as they soon get a knowledge of the various difficulties. Where the fires are left to the tender

mercies of servants, they ought to be fitted with a volumetric governor, as a guard against carelessness; but where the consumer looks after his or her own fire, the gas can be regulated quite well by the tap.

After touching upon steam and steamless radiators and washhouse boilers, he said: The many and varied applications of gas for heating purposes, not forgetting that neglected field, conservatory warming and tailors' stoves, are such that one may be pardoned for feeling quite optimistic as to the future of our industry, and we should look kindly, if not entirely disinterestedly, on the labours of all Committees formed to abolish the evils of black smoke, from the atmosphere of our large towns.

Dealing with the lighting of open spaces, the author said: In the high-pressure systems, we have those which compress the air supply to the mixing-chambers of the burners, and others which compress the gas, by either water, electric motor, or other mechanical means. Prominent in these fields are the well-known Sugg, "Selas," "Millennium," Sale-Onslow, and last, but not least, the well-known Keith and Blackman. There is also the system of self-contained high-power lamps, such as the Lucas, Chipperfield, Thermopile, Scott-Snell, &c. Speaking from my own experience and observation, I consider the necessity for using high-pressure lighting is being strongly assailed by the high pitch of excellence to which self-intensifying lamps on ordinary pressures have been brought within recent years. The first cost of installing a high-pressure plant is certainly heavier, the breakage of mantles and glassware is greater, more heat is generated, and the burners require to be cleaned more frequently. There is also liability to interruption by temporary failure of the motive power. A slight comparison of the maintenance costs of two high and two low pressure installations of almost equal candle power may prove interesting.

No. 1 High Pressure.

—	Number of Burners.	Candle Power.	Total Illumination.	Gas Consumption.	Average Maintenance per Lamp.
			Candles.		
No. 2 high-pressure	55	150	8,250	275	12s. 3d.
	40	300	12,000	400	9s. 1d.
No. 1 low-pressure.	64	125	8,000	256	2s. 4d.
No. 2 low-pressure.	84	125	10,500	336	2s. 9d.

The above figures are a round twelve months' maintenance; and include the upkeep of mantles, rods, gauzes, and glassware, and are almost net prices, taken from our own experiences. The wonderful results attained by the new Keith single-mantle lamps, as used so successfully to illuminate the grounds of the recent Edinburgh Exhibition, and of which I await with interest a report of the maintenance charges, may materially alter my opinion of the high-pressure lighting systems. Towards the idea of each lamp being its own compressor, where large units of light are considered necessary, I confess to having a warm side. The risk of failure in a large area is eliminated where each lamp stands for itself, as this system implies. One of the most ingenious lamps of this type calls in the enemy, in the shape of electric energy to its aid. In the top of the lamp a magnetic field in the form of a thermopile is fixed; the waste heat from the burner generating an electric current, which is conducted down the side of the lamp to a little fan. This fan, revolving at a speed estimated at 2000 revolutions per minute, in a bath of oil, sucks in the air and compresses a powerful current through side tubes to the burner, and in 30 to 45 seconds from lighting, it gives a splendid and beautiful light. In the "Chipperfield" lamp, one of which I have here, there is a small engine on the top, which is worked by the heat of the lamp.

In the fitting of a low-pressure installation, the fixing of a good governor, where the minimum pressure is not less than 2 inches, becomes an excellent investment for the consumer. Take a two or three flat building as an illustration. A very effective method is to fix a governor on each landing, set at about 2 inches when all are lighted; then, having all the burners fitted with adjusters, regulate each one to its own requirements.

Turning now to public halls and churches, where the ceilings are generally lofty, I consider the old principle of roof-lights, or sunburners, to be the most effective. The converting of hanging pendants or coronas from flat flame to incandescent, is apt to be unsatisfactory. The Glasgow Gas Department introduced what I hope you will forgive me for claiming as one of the best methods extant. Under the supervision of our Chief Engineer (Mr. Alex. Wilson), a burner or roof-light with 28 inverted mantles on it was made in our own workships. There is no risk of broken glass, and it can be detached ready for lowering in 10 minutes. The consumption is 84 cubic feet per hour.

A very smart little burner consuming 7-10ths of a cubic foot at 14-10ths pressure and giving a light equal to 10 candles per hour, has been patented by our Mr. Wilson, and is being fitted in hundreds in the closes and entries of Glasgow, where the old rat-tail burner has hitherto reigned supreme. It is made of cast iron, to lessen the temptation to steal; and the globe is entirely closed.

I refrain from dealing with street lighting, which is at present in a state of transition; but evidence is not lacking that one of the systems of the near future would seem to be, at least for side streets, inverted burners controlled by some clockwork appliance. No paper on lighting would be complete without referring to the use of switches, pneumatic and otherwise. These with a little attention are now quite reliable. The consumption by the bye-pass is very little; but it certainly begins to tell when there are two or three hundred in use. Lamp and burner makers might give the question of bunsen pilot lights greater consideration than they have done in the past. The advantages are no trouble with corrosion or deposit at the tip, stronger resistance to draughts, and a lessened consumption, as we have satisfied ourselves from tests. If the self-lighting mantle, however, can be produced cheap enough and reliable, lamp makers will be relieved from the necessity of producing flashing and other types of pilot lights. These mantles have recently been on test, and have been giving very good results. The changes in temperature—very cold or frosty weather, and also damp weather—seem to affect their igniting properties; but this remains to be tested thoroughly by more extended trials. For installations of inverted lamps, where several lights are desired to be switched on or off once (say), from the meter or any central point, there is room here for some of our enterprising governor makers to introduce a sealing valve constructed to retain the gas in the pipes, so as to lessen the explosive shock and damage to the mantles at lighting time.

Mr. M'Ghee showed a short series of views on the screen, illustrating the arrangement for automatic lighting of lamps, muffle furnaces, &c.

Discussion.

Mr. J. F. Harrison (Glasgow) related that about a year ago it was thought desirable to erect a cremator in the abattoir, for disposing of any diseased cattle which might come to the market. The question was gone into as to whether they should put down one with a coke-fire or with a coal-fire, taking from three to six hours; or whether they might invent and put down a gas-cremator. Mr. Wilson gave instructions to have a design prepared, and, with certain modifications, it was erected. It had been tried that day, with most satisfactory results. He was not able to give the figures, but he could say that the beast was disposed of in half the time specified by the best coke or coal fire cremators. Another point he should like to mention in connection with the 28-light corona was that when it was originally designed it had a valve at the bottom, to act automatically. By simply turning off the cock at the main, the bye-pass was automatically lighted, and maintained alight, by the gas in the pipe. This, owing to the slight reduction of pressure caused by the valve, had been dispensed with. It always struck him that lighting was viewed too much from the aspect of producing an intense light. Such a course was necessary in competing with the intense light produced by electricity; but he considered they were very apt to overlook the æsthetic point of view. For instance, some buildings were very prettily decorated, but the decorations were much spoilt by the intense white light thrown upon them from electric or incandescent gas-lights; and he thought that, by attempting to hide the lights, and casting them in directions away from the spectator, more pleasing effects could be produced, and much less light would be required to produce the same effect. When they had an intense light, the retina of the eye became tired in a very short time. To his mind, the constant competition between gas and electricity to produce the most intense light was by no means an advantage without some drawbacks.

Mr. A. Smith (Tradeston) said he was very much interested in what had been said about the industrial uses of gas, because a year or two ago he made a list of them, and he thought none of those mentioned in the paper were on it. This showed pretty well the progress they were making; and, as Mr. M'Ghee had said, they must continue to do so. There were hundreds of uses to which gas might be put. As the author mentioned, customers were not so particular as to cost if they got more work done, and done efficiently. A great deal could be said for gas-fires for domestic heating, both as to their efficiency and their economy, because—as, for instance, in sick-rooms or bedrooms—they could moderate the temperature to anything they wished. Instead of keeping a coal-fire going the whole day, they might have a gas-fire on for any length of time they pleased. He had always thought that, in a city like Glasgow, they might have had an installation of lighting on a larger scale than they had, but not necessarily of high pressure. No doubt there were many good installations in the United Kingdom both with gas and electricity; but he should like to have seen one of intense gas lighting, say, in George Square, where the electric light had held sway so long. If gas lighting were installed, even on the existing pillars there, it would be a wonderful revelation to the citizens of Glasgow as to what gas could do.

Mr. P. M'Dougall (Helensburgh) said he should like to ask Mr. M'Ghee if he would state his opinion on the relative advantages of gas transmission by means of the high-pressure air system and gas respectively. It very often happened that, owing to the increasing demands of some outlying district, the problem of maintaining an adequate supply at the far end of the district had to be faced; and, in consequence, the gas manager had to consider which of the various methods of raising the pressure would suit his case best. That of increasing the flame temperature in incandescent burners, by means of the high-pressure air system, consisted of compressing the air instead of the gas. The advantages claimed for this system were small outlay for the plant, the ease with which the system could be applied, and, of course, no leakage

of gas. Then, again, there were numerous methods of increasing the pressure of gas to high-power burners. It was interesting to notice that, with the different types of pressure-raising apparatus, the pressure at the burners varied from 6 inches up to about 50 inches of water. What advantages were to be gained by working with such high pressures? Though he recognized those to be obtained from high-pressure distribution, he could not see the reason for using pressure of more than (say) 20 to 25 inches. The more they raised the pressure, the more they increased the liability to leakage and injury to mantles. At Helensburgh, their largest customer—the Shandon Hydro.—was situated about six miles from the gas-works. Some time ago, Mr. Blair, the Manager, received notice that at times they were not getting sufficient pressure for their requirements. After making some tests, extending over 24 hours, he was satisfied that the Hydro. was not getting sufficient pressure when the largest holder became uncupped. This, of course, meant the laying of a larger main, or else adopting some arrangement for increasing the pressure. After careful consideration of the various means for doing this, Mr. Blair came to the conclusion that sufficient pressure could be given for all purposes so long as he could keep his largest holder cupped, which threw a pressure of 5½ inches. However, with a maximum daily output of about 300,000 cubic feet, and storage capacity of 250,000 cubic feet, it was impossible to keep the holder always cupped. Instead of adopting pressure-raising apparatus, Mr. Blair cut out his smaller holder, which gave a pressure of 35-10ths, and put in the same tank a Gadd and Mason three-lift spiral holder, which gave a pressure of 7½ inches of water. With this holder he could always ensure his other holder being cupped, and by this means give sufficient pressure at the far end of the district, besides greatly increasing his storage capacity, at a minimum of cost. He (Mr. M'Dougall) thought it had been proved by Mr. Allen, of Liverpool, in his paper on "High *versus* Low Grade Gas,"* that every low-grade gas, when it was used in an incandescent burner, gave a light much in excess of that which was afforded by high-grade gas when consumed with a flat-flame burner. He considered that those who were responsible for the management of gas-works ought to use every effort to encourage the employment of gas for heating, cooking, and power purposes, because he felt sure that it was in this direction that any material increase in sales might be looked for. This would be the means of reducing their capital per million cubic feet, by catering for a regular load. Another point which occurred to him was that, in going in and out among consumers, complaints were often heard about the bad light they were getting from incandescent burners; and in nine cases out of ten the gas was blamed. Examination, however, revealed the fact that, instead of the gas being at fault, the defect was caused by dirty burners, or was perhaps due to the gas and air not being properly regulated. In order to remedy this state of things, he thought that in all large towns a superintendent of incandescent burners should be appointed, who would instruct consumers as to how to obtain the greatest efficiency from these burners.

Mr. D. Currie (Paisley) remarked that the question of water heating brought to his mind that a good deal might be made of the system of water heating that was done by geysers. He thought much business might be done in this direction. Geysers were very handy in houses, bath-rooms, and wash-houses; and if they worked automatically—that was to say, would shut down the gas whenever the water was at a certain temperature, and not being used—a good deal might be done in advising the use of them.

Mr. J. Welsh (Glasgow) thought that while managers might manufacture as much gas as they could, and gas of the very best quality, their time and their energies must be directed to getting a sale for it. They should go to the consumers and encourage them in the way of sales. Other industries had done this. They would get the poorer people, who, he believed, though they did not spend large sums upon it, really made gas pay. It was a well-known fact that the Corporation of Glasgow estimated for hundreds of fires which never arrived, simply because of the question of cost. In gas-fires, he believed, they had a future; and also in the supplying of gas for heating water.

Mr. T. H. Whitehead (Provan) said he would like to have Mr. M'Ghee's opinion in regard to heating-stoves—whether he could convince him that, with (say) an excess of 25 per cent. of cost over coal, he could use a gas-fire. If he could, he would be very pleased. There was not the slightest doubt in his mind that gas-fires should be adopted. They were very serviceable, and very useful; but, of course, it was a question of cost, and everybody looked at this.

Mr. F. L. M'Laren (Dumbarton) said he was interested in the experiments in the automatic lighting of mantles, and wished Mr. M'Ghee every success, because of the field they would open up for lighting. What was it that had brought incandescent electric light into such universal prominence? He thought they would agree with him that it had been greatly due to the handiness of the switching on and off of the lights. Once they had an automatic lighting mantle, there could not be the slighest doubt that the incandescent electric lamp would find a very great competitor, and it would open up a huge field for the gas manufacturer. With regard to the introduction of intense lighting, it could be introduced in the Glasgow Docks and Clyde lights. These were fields in which the light could not be too intense.

Mr. J. A. Smith (Tradeston), referring to what Mr. M'Ghee had said about the sweating of the tyres upon the wheels, said that while he was serving his time in a marine shop they had a great deal of this work to do. When he started they were sweating on brasses with char fires, which was a very tedious job, as the work had to be kept turning most of the time it was on the fire. They put in gas, and it proved very satisfactory.

Mr. R. A. Campbell (Provan) said it had always been a mystery to him why the Glasgow Corporation Gas Department would not let gas-fires on hire. If a consumer applied for a gas-cooker, he immediately obtained what he wanted, with the addition of the necessary fittings up to, he believed, 50 feet of pipe. But if he made application to have a gas-fire installed, he was told that they would supply him with an estimate, which was usually rather high. He knew of many families who would willingly use gas-fires, but could not see their way to incur the first cost.

The President said the paper was one which they might call both scientific and practical, and it left no doubt in their minds that Mr. M'Ghee knew everything on the subject that was to be known. He had learnt a great deal from the paper that he did not know before; and he was sure many of the members would be in the same position. Mr. M'Ghee had put before them the whole question of the gas industry as it touched the two great subjects of lighting and heating, and had drawn their attention to the fact that in future they would have to consider gas as a fuel much more than as a lighting agent. There could be no doubt that, by the introduction of incandescent lighting, consumers were saving gas; and therefore manufacturers of gas were suffering to this extent. There was not the same demand for gas for lighting; and therefore it seemed all the more advisable that they should push its sale on the industrial side, and also for cooking and fires. One point which he had not heard mentioned in the discussion, and to which he would like to draw their attention, was that the quantity of gas burnt by the average consumer—say, in Glasgow—for lighting, was a very small proportion of the amount he required for domestic purposes. That was to say, taking the case of a man who was paying a bill of £1 for gas, of this amount probably 5s. would be for lighting and 15s. for cooking. He believed the use of cookers, and not lighting, had now come to be the mainstay of the gas industry. He recently noticed in a publication a statement that only 38 per cent. of the gas consumers in the country had cookers. It was of no use to talk about the saturation-point having been reached for these appliances if only 38 per cent. of the consumers had them. He questioned if, in Glasgow, 50 per cent. of the consumers had cookers; and until they reached about 90 per cent. they need not say there was no field for gas consumption, or for pushing the sale of cooking-stoves. The most important point which had been touched upon, however, in his opinion, was that which had been raised about gas-fires. In the same paper he read that in London only about 20 per cent. of the consumers had gas-fires. Therefore, notwithstanding the great future there was for gas for industrial purposes, he believed that the line upon which they should go was to push gas-fires. He would go the length of saying that providing gas-piping free would pay, because of the large quantity of gas that would be consumed. The problem applied in many directions. It meant that there would be a great saving in the consumption of coal in the country; and those who were manufacturing gas would, to a certain extent, help towards this by cutting down the demand for it. The gas companies would get the coal, and the public the gas. The industrial future for gas was immense; and he believed the demand for it for fires was one of the largest outlets they had to look forward to. He asked the members to give Mr. M'Ghee a hearty vote of thanks for his interesting paper.

The vote having been accorded,

Mr. M'Ghee thanked the members for their cordial reception, and the President for his remarks. He said there was a good deal in what Mr. Harrison had said about artistic fittings. There was certainly room for improvement in this direction. But they had found—in the show-rooms, for instance—that what customers wanted was (say) a globe to match the furniture or the wall paper and, of course, they must stock goods to meet these ideas as well as their own. If they sent customers away with the globe which they were convinced would give the best value, they might leave dissatisfied. He expected soon to see one or more of their largest buildings in Glasgow lighted in the way Mr. Smith suggested. It would probably be by single incandescent high-pressure lamps, rather than by a compressor, either air or gas. He really did not understand what was the advantage of getting up to such a pressure as 50 inches, as he considered that 20 inches was ample for any system. The installation in Fleet Street was to be worked at 60 inches; and he thought it would be wise to wait, before saying more, and see what the results were to be. The Keith light in Edinburgh was certainly splendid. If the maintenance charges of this installation should not be published, those referring to the Fleet Street installation certainly would be. When consumers grumbled about bad gas, it was almost invariably found that the fault was due either to the lack of attention to the burners or to irregularity of pressure; but it sometimes arose from the burners not being fitted with adjusters, and the pressure in the district having been altered. They had not in Glasgow much of a field for geysers, because the tenants would have to be at the expense of making the water connection and getting the apparatus fitted up; and there was also the landlord's right of hypothec to be taken into account. He did not go in for hiring-out gas-fires. His opinion on this matter had been backed up by one or two companies who had hired gas-fires for some years, but who had

* See "Journal," Vol. XCVI., p. 601.

discontinued it. He would go the length of fitting up a fire free, because he found this, not the purchase, to be the greatest stumbling-block with customers. But the Glasgow Gas Department were also faced with the private traders. These had influence in the Town Council; they were under promise to them to refer applicants for gas-fires to private traders. At the present time he would not say that, at the price of gas in Glasgow, continuous heating with gas would be cheaper than with coal. The arrangement he had described for the automatic lighting of incandescent gas-lamps would certainly be a great step in advance. It was not yet on the market, and the price he had obtained was certainly prohibitive; but if it stood the tests and the alterations of temperature, it would be a great boon, particularly for such purposes as dock lighting. Duplex burners were not supplied nor taken up to the extent they could be. The makers charged about 7s. 6d. extra for them; but certainly one was a very great advantage. It took away entirely the dead appearance of the fire (which was one of the greatest objections to gas-fires raised by women consumers), and kept the room cheery. One or two of their consumers, who had gas fires and cookers, adopted electricity for lighting. When their gas bills were sent in, they came and pointed out that they were being charged for gas nearly as much as before. They could not credit that the slight difference was all they had been paying before for lighting. In Glasgow there were, roughly, 15 per cent. of their consumers provided with gas-fires; and 5 per cent. were fitted by private traders. Three of their consumers were putting in as many as 54 gas-fires—two of them 22 and the other 32. A few more such as these would bring up the percentage. The number of gas-cookers on hire amounted to about 30 per cent.; but when there was added what had been sold, of rings or grillers, in consumers' own premises, the percentage could easily be brought up to 40. These were irrespective of what had been sold by private traders. There was difficulty in estimating the number of gas appliances in houses in Glasgow; but he could safely say it was not less than 50 per cent.

At the close of the meeting, Mr. M'Ghee explained some of the appliances he had on exhibit, including the Chipperfield lamp.

Manchester Student Suffocated by Gas.

At the Hartley College, Manchester, on Monday morning of last week, a student, aged 24, named William H. Rowe, of Whitehaven, was found asphyxiated. The room in which he had slept was full of gas, and he was in a comatose condition, from which the doctor failed to bring him round. Investigations showed that the gas in all the rooms had been turned off at the main-pipe on the ground floor; but the gas had been turned on again. The bedroom had no chimney; and the ventilation was obtained from a window and a ventilator over the door, both of which were shut. At the inquest, a fellow student said he had never seen deceased use the gas in his room; and it was contrary to the rules to do so. Every student had a lamp. The butler said the electric light was used; and he had turned off the gas at the meter on the Sunday evening. Another student stated that late on Sunday night he turned on the gas in the corridor, as he wanted a light in his bedroom. Dr. Duff gave evidence that death was due to poisoning by coal gas; and the gas in deceased's room was turned on. The Deputy-Coroner said the one main-tap turned on thirty or forty lights. A verdict of "Accidental death" was returned; and the Jury recommended that the college authorities should keep locked the door to the place where the main tap was situated.

The Electricity Undertaking at Bath.

It was reported in our columns a few months ago that the Bath Corporation had resolved to sell their electricity undertaking to Mr. Ernest Schenk, who had in contemplation the formation of a large supply Company with powers over large tracts of Somerset and Wiltshire. He was to pay the amount expended on the works to date (£162,939) by annual instalments spread over thirty years, less £22,500, which was to be paid down. The Corporation were to retain the moneys paid into the sinking fund (£34,938); and the Board of Trade now point out that this meant so much profit out of the transaction. In addition, Mr. Schenk contracted to spend £30,000 on the works forthwith, to reduce the public lighting charges, and to give the Corporation for ever free energy to the value of £1000, if a sale in perpetuity were allowed, or £500 worth if only a lease resulted. Roughly, it was calculated the bargain was equal to 2d. in the pound off the rates. The Board of Trade, however, have refused their sanction to the sale. They make the following objections: (1) They observe that the Corporation, by retaining the money in the sinking fund, are going to make a large profit, and it is contrary to the Board's practice to allow an undertaking transferred to be charged with any profit to the party transferring. (2) As to the provision to transfer the undertaking in perpetuity, they say they "are not aware that the Corporation have any power to contract their successors out of the rights of purchase conferred by section 2 of the Electric Lighting Act of 1888; and the Board would, therefore, be unable to sanction such a proposal." They go further, and state that they are advised that the proposal would be inoperative because of the Act. The effect of the Board's decision will probably be that the undertaking will remain a municipal one.

British Standard Pipe-Threads.—As from the 1st prox., all tubes and fittings manufactured by Messrs. Stewarts and Lloyds, Limited, will be screwed with the standard threads authorized by the British Engineering Standards Committee, when required by customers; and as from the 1st of July next, they will be so threaded unless otherwise ordered.

REGISTER OF PATENTS.

Hydraulic Main.

NUTTALL, L. W., of Gosport.

No. 10,573; May 15, 1908.

This special form of hydraulic main for use in gas manufacturing plant, or in connection with any carbonizing plant from which gas is evolved, either as the primary or secondary commodity, is said to secure: (1) A perfectly even seal for all the retorts connected to the hydraulic main. (2) Tar is prevented from accumulating in the hydraulic main; being made to flow to the lowest part, whence it passes and is periodically flushed through a tar outlet into a tar-main running underneath and the full length of hydraulic mains. The tar is conveyed by this main to a tar-tower. By this arrangement the hydraulic main is kept entirely free from tar, and, consequently, there is no formation of pitch. (3) The hydraulic main can be so worked that all the retorts in action are sealed when open for charging, and unsealed as soon as all the retorts are charged with coal. This, it is said, "enables the main to work during the charging period and fulfil the ordinary functions of a hydraulic main; but directly the charges are finished, and until the next period of drawing and charging, the main is worked as a dry main, without the gas having to pass through a liquor seal at all."

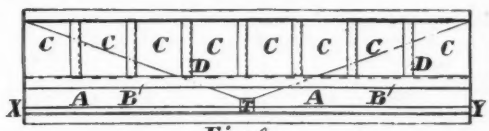


Fig. 1.

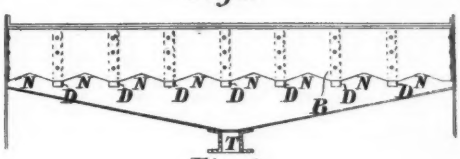


Fig. 2.

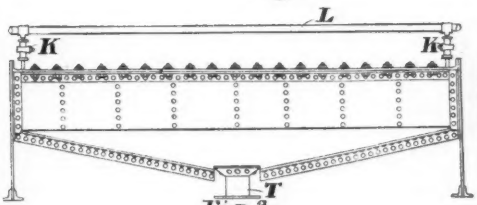


Fig. 3.

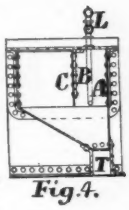


Fig. 4.

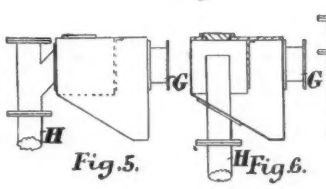


Fig. 5.

Fig. 6.

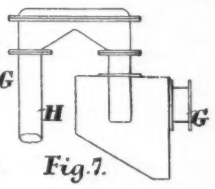


Fig. 7.

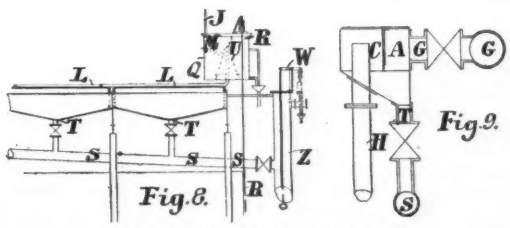


Fig. 8. Fig. 9.

Nuttall's Hydraulic Main Arrangement.

The feature of the hydraulic main shown is that the front plate and bottom of the main are all one plate. By this arrangement, all the tar flows without obstruction of any kind to a tar outlet placed in the lowest part of the main, and is connected to a tar-main running underneath and the full length of the hydraulic mains. The tar flows along the tar-main to a tar-tower, whence it is run off at intervals to the tar-well. In cross section, the main slopes from front to back—a construction that ensures the tar flowing by its own gravity away from the hydraulic main as quickly as it is formed, and is replaced in the hydraulic main by the lighter liquor, so that the main is always full of liquor and entirely free from tar. The tar is constantly flowing from a higher to a lower level, and in no case is a depth of tar retained and compelled to flow to a higher level by the weight of the liquor on top of it.

A single plate is cut with notches of such shape that, when sufficient liquor is in the hydraulic main to seal all the retorts, the depth of seal is least equidistant between the compartment plates D. The seal-plate is fixed longitudinally inside the hydraulic main; and division plates are attached to make compartments C—the number of compartments being equal to the number of retorts to be attached to the hydraulic main. The plates are made of greater depth than the seal-plate. The hydraulic main is made of the cross section shown, or any other that will give the necessary slope to the tar outlet.

The notches in the seal-plate are cut exactly equal in depth; so that

when it is set with the hydraulic main level, each retort connected to the hydraulic is sealed to a similar depth. The shape of the notch is to prevent the gas from bubbling through the liquor near the division or compartment plates, as, owing to the lighter seal being in the centre of each chamber and away from the division plates, the gas finds its way from the compartment C into the portion of the hydraulic main lettered A without any danger of its passing from one compartment C to another.

The ascension pipes are connected to the hydraulic main with alternative forms of connections, as figs. 5 and 6, or the usual type of bridge and dip pipe can be used as in fig. 7.

In addition to the arrangement of the hydraulic main, the flow of tar is accentuated by flushing with liquor by means of the pipes L, when a large quantity of liquor is allowed to pass through the hydraulic main, along the tar-pipes and away by the overflow pipe of the tar-tower. "This accelerates the flow of tar from the hydraulic main, and if desired for sealing off the retorts, it fills the main to the required level during the operation."

The hydraulic main is worked in such a manner that when the retorts are open during the period of drawing and charging, they are sealed by liquor. Thus no gas can return from the foul-gas main, even if there is a slight back-pressure in the foul main; while during the period of gas-making, when the retorts are closed, a quantity of liquor is run out of the hydraulic main, so that there is no seal nor obstruction of the gas in its passage from the retorts. Provision is made for instantly filling the hydraulic main with liquor, and so again sealing off the retorts for the next period of drawing and charging.

The method of accomplishing this is shown in figs. 8 and 9. The weir valve on the tar-tower is arranged to work at either of two pre-arranged heights (both of which are adjustable). The higher position is that which causes the liquor to seal off the retorts to the required depth; the lower position unseals all the retorts. A constant seal can therefore be worked, or the seal can be removed as soon as all the retorts are charged, and remain unsealed until such time as it becomes necessary to open them again.

When the time arrives for drawing and charging the retorts, the weir valve V on the tar-tower Z is raised to its higher position by means of the lever arrangement W, and the pipe cover U in the tank Q is raised by pulling the rope R. The tank Q being fixed at a higher level than the hydraulic main, as soon as the cover is raised, the liquor is syphoned over through the pipes L—the quantity of liquor so run being more than sufficient to fill up all the hydraulic mains to the required level for effectively sealing all the retorts. The excess of liquor runs away along the tar-pipes S and through the overflow valve on the tar-tower, "and so helps forward the flow of tar from the hydraulic main." Alternatively, a continuous flow of liquor may be arranged to pass through the hydraulic mains, tar-pipes, and tar-tower if desired. J is a pipe fitted to supply liquor to the tank Q; the filling being done automatically by the ball-tap M.

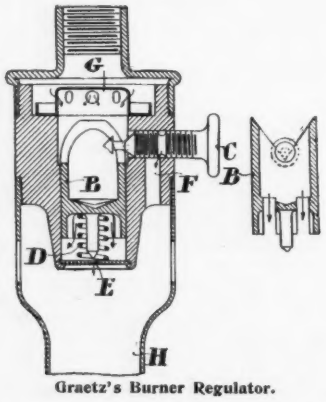
In fig. 1 is a plan of the hydraulic main with the top cover removed, and showing the gas space A, seal-plate B, compartments C, and division plates D. The tar outlet T is also shown. Fig. 2 is a section showing the seal-plate B with the division-plates D, and the shape of the notch N. The tar outlet T is also shown. Fig. 3 is a front elevation, showing the appearance when fitted up, together with the liquor flushing pipe L and regulating cocks K. Fig. 4 is a cross section through the centre of the main, and shows the gas space A, seal-plate B, and compartment C, together with the liquor pipe L. Figs. 5 and 6 show alternative methods of connecting the ascension pipe H to the hydraulic main. G is the gas outlet to the foul main. Fig. 7 shows the main connected to the ascension pipe H by means of the ordinary bridge and dip pipe. Figs 8 and 9 illustrate the method of working, and have previously been described.

Regulating Devices for Incandescent Gas-Lamps.

GRAETZ, M., of Berlin.

No. 10,223; May 11, 1908.

This invention relates to means used to regulate the nozzles of incandescent gas-lamps and to prevent the parts jamming. Another object is to provide, in conjunction with the regulator, means for returning to the gas-conduit any gas leaking past the actuating screw of the regulating member.



Graetz's Burner Regulator.

As shown, gas enters the nozzle through a perforated dust-catcher G, into a cylindrical opening in the central part in which is the regulating member B. Through the side of the nozzle-body an actuating screw C passes, provided with a knob on its end adapted to engage with the inside of the regulating member and prevent the complete withdrawal of the screw.

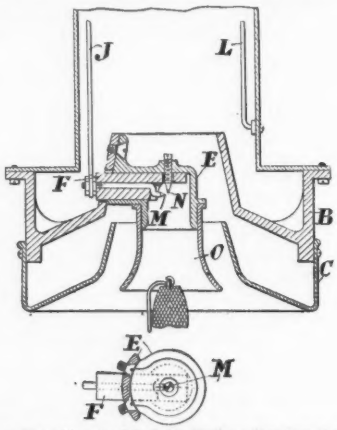
The novel feature of the invention consists in forming the end nearest the nipple opening of the regulating member, hollowed out so that a long guiding surface is provided, while at the same time the usual spring D, which surrounds the regulating pin, is enclosed for a part of its length within this hollowed-out part. The spring thus contains so many coils that it is prevented from coming in contact with the walls of the nozzle body. The pin is arranged to regulate the nozzle opening E, and thereby the quantity of gas passing to the mixing-tube H. The means for returning to the mixing-tube any gas leaking past the jointed parts are provided in the body of the nozzle itself—the regulating screw C, with its annular groove in communication with a passage F in the nozzle body which leads to the mixing space.

Incandescent Gas-Lamps with Electric Ignition.

DELAGE, M., and WOOG, P., of Paris.

No. 13,852; June 30, 1908. Date claimed under International Convention, Dec. 31, 1907.

The object of this invention is to provide a lamp (suitable, say, for ceiling lighting or for railway vehicles) furnished immediately above



Delage and Woog's Electric Igniter for Gas-Lamps.

the top of the mantle with a bell within which the sparking plug is contained.

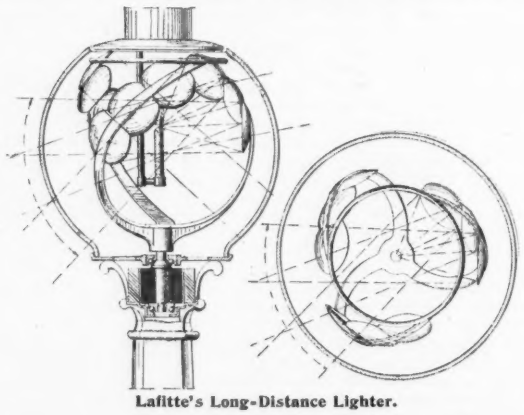
Attached to the carrier B, by a porcelain socket E, is the bell O, the mouth of which covers the top of the mantle and opens just beneath the neck of the reflector C. F is the sparking plug (of porcelain) carrying an insulated terminal M connected to the lead J, while the other terminal N is in electrical connection with the body of the lamp which is connected to the lead L, which, with J, is connected to a magneto or other source of current. The result of the arrangement is that no amount of draught will prevent sufficient gas accumulating in the proximity of the terminals M N within the bell; and thus ignition is ensured.

Long Distance Lighting.

LAFITTE, J., of Biarritz, France.

No. 15,746; July 24, 1908. Date claimed under International Convention, July 25, 1907.

This invention relates to a system of intense lighting at long range by the circular dispersion of rays emanating from a luminous focus.



Lafitte's Long-Distance Lighter.

The patentee remarks that, compared to well-known systems in which one or two luminous pencils are given varied movements for the purpose of dispersing the rays on the surface to be lighted, his proposal consists chiefly in a certain number of projectors or reflectors helically arranged on a rotary support about one and the same focus, so as to afford free passage to the luminous pencils covering distinct zones; the shade intervals between the pencils being themselves covered by the dispersion of the rays brought into movement. A uniform and constant lighting of the surface covered by the apparatus is thus ensured, it is said.

In the example illustrated, the invention is applied to a lamp-post

carrying an electric arc regulator, but any other luminous focus is, of course, available.

The arrangement of reflectors is such that the rays of the luminous focus reflected by each pass through the opposite corresponding interval comprised between two other reflectors, in the form of a cylindrical (or more or less conical) pencil, in a special direction which may be different from that followed by the pencils of the other mirrors, or similar to it.

The specification continues: Taking into consideration (1) the optical phenomena of the persistence of luminous influence on the eye which, after having been subjected to the action of a direct or reflected light, retains the impression for one-tenth of a second even after the luminous emission is interrupted, (2) the result produced by each reflector in directing the pencil projected to a greater distance than that which would be reached by luminous rays without its use, (3) the movement of revolution given to all the reflectors about the luminous focus—it will be sufficient, in order that the space and the objects situated in the space in the neighbourhood of the lighting apparatus should appear permanently lighted, that each reflector should make a fraction of a revolution corresponding at least to the number of branches in less time than the phenomenon of luminous persistence lasts on the retina after the interruption of the lighting.

In the arrangement illustrated, the branches are supposed to be three in number, helically arranged for the purpose of affording a more convenient passage to the rays reflected by each reflector; the latter benefiting also by this arrangement, which enables them to be made of larger diameter.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Proposed Livesey Memorial.

Sir,—None of the suggested schemes seems to my mind to be entirely satisfactory, inasmuch that the gas industry will not solely benefit in proportion to the sum of money which it is hoped will be subscribed.

A fund for the endowment of the Institution of Gas Engineers would produce an income which could be at the disposal of the Council for practical research work, to be carried out at various works and laboratories throughout the country, for the benefit of the gas industry at large, and also for the benefit of various members who might require information and not be in a position to carry out the necessary experiments.

This would not only enlarge the scope of the Institution, but would increase its utility, and thus benefit its members and the industry generally.

Vauxhall Gas-Works, S.E., Dec. 3, 1908. W. George Head.

Competitive Advertising.

Sir,—In your leading article on "The New Gas Commercialism" (*ante*, p. 394), referring to my paper on gas advertising and the discussion thereon, you ask what should be done "when the electricity enterprise was the attacking party and sedulously circulated traducing statement." The question is raised because two or three members deprecated making any attack on competing electricity enterprise.

It certainly seems a pity that the important point you have raised should not have aroused some discussion. Possibly this is due to the fact that at this season of the year most gas managers are at their busiest.

I am in full sympathy with those speakers who deprecated the attacking of competitors in their advertising—that is, as a general principle. There are, of course, those exceptions which are said to prove the rule; and it is by no means good to be ever only on the defensive.

But as a general principle of advertising, I hold that the sound and effective plan is to keep before the public simply and solely those plain facts which appeal to their instincts in everyday commercial and domestic life. These facts should be submitted in such form that he who runs may read; that "the man in the street" may readily grasp at sight without mental effort; and that, as far as possible, they be free from argument, calculations, or any other handicap.

The pictorial illustration, based on actual fact, and which may at any time be supported by references to practical and local experiences, most excellently carries out this idea. It may be supplemented by a few (very few) single line dogmatic statements of actual results, which must be well within the practical possibility of the ordinary consumer. Care should be taken that all such statements (and, indeed, all such advertising literature) should, as far as possible, be self-apparent to the reader, and therefore self-convincing. Unless, having read carefully the advertisement, the reader passes on feeling assured that, "on the very face of it, it must be true," the primary object of the advertisement has failed.

I believe, and certainly my experience up to date has fully supported the conviction, that these simple methods of submitting the truth to the customer will be found fully equal to the task of combating the "fairy tales" certain of our opponents have been driven to by the stress of circumstances and bad times. We are sorry for them in their plight; but if after "a passage of arms with foils . . . they are first to remove the buttons," I cannot go further with you in saying that "they must be fought with weapons of their own choice." This, because the weapons of their own choice are (as instanced by the posters of the Associated Municipal Engineers of London which we saw at the Southern District Gas Association meeting), as you say, "highly coloured, vulgar, and offensive, and scandalously untrue" in their implication. The weapons are not merely foils *minus* "buttons;" they are poisoned. The only effective way of dealing with them is as indicated above.

We are threatened with immediate competition here. Only this past week one of the local papers has been publishing its ideas of the "Battle of the Lights," with interviews and opinions of the "Rival Managers." The Electrical Engineer states his case well, and naturally makes all the points he can. But there is nothing, from start to finish, of objectionable reference in any way to gas or to gas appliances. Needless to say, the same remark applies to our own methods. As long as the competition is conducted on such lines, the public will impartially judge between the two, and will desire to place or divide its custom according to circumstances and intrinsic merit. But any "hitting below the belt" by either party would, I am sure, be as strongly resented by the public as by those most concerned, and would be suicidal—to the culprits.

To those companies who may be situated under far less satisfactory conditions, and where the competition is from "the powers that be," and is utterly unscrupulous, we more favoured undertakings tender our fullest sympathy and moral support. But while their engineers will be among the last to "sit inactive while the interests entrusted to their official keeping are being slandered," and will see to it that every customer and possible customer that can be approached in their district is kept fully informed of actual facts, there should be as little as possible of reference (or no reference whatever) to their opponents or their statements. Any opposite course is to advertise, and thus indirectly to assist, their opponents. I again deprecate attack on the enemy, preferring to concentrate all energies in developing our own business.

Chichester, Dec. 5, 1908. T. E. Pye.

The Dangers of Petrol Gas.

Sir,—In your issue of the 17th ult. you reported an explosion and fire from the manufacture of air gas. May I be permitted, as an expert in air-gas machines, to point out that your report was rather misleading? The result as stated by you was not obtained from air gas, but from a contrivance where the spirit is brought into the room or place to be illuminated, and not by a contrivance by which poor or highly diluted vapour is conveyed to the point of light—so diluted, in fact, that explosion or ignition could not have taken place.

In reply to "J. W. B.," whose letter appears in the issue for the 24th ult., I may point out that the methods carried out by the inventor and himself are appalling in the extreme. The fact of any person with ordinary intelligence making a carburettor of wood is quite sufficient to enable me to say that he must have been entirely ignorant of the searching properties of petrol. Then, again, the fact of using a cork from a beer-bottle to close an aperture for the inlet of petrol is to me scarcely creditable.

The next item is the bicycle pump. The fact of using this makes it wondrous to me that the inventor was not forcibly removed from the building by a serious explosion, as the action of a bicycle pump is not positive. "J. W. B." proceeded in the right manner to a certain degree by providing a non-return valve, inlet and outlet pipes, hot-air engine, and a Roots blower. But he does not say what tap was turned on, so I presume it was a burner tap; and, from what I can gather, rich gas was being manufactured at the time, and auxiliary air being used at the burner, as in incandescent coal-gas lighting. The fact of placing a 36 lb. weight on the gasholder brought down the bell of the holder when the tap was turned on; and this bell, resting on the bottom of its holder, ceased to give pressure against the lighted burners, with the result that either the burner in question or the engine burner flashed-back up the main and into the holder, where it exploded the body of vapour left in between the top of the bell and the level of the water. I have never yet had a hot-air engine that would keep up a bell with a 36 lb. weight on top of it; and I would ask, why use such a weight as this, when a bell made of No. 20 gauge iron will give 22-10ths to 25 10ths pressure?

I should suggest that "J. W. B." might induce the "inventor" to fix up the machine as "J. W. B." first saw it, and consign it to the British Museum. The statements made by "J. W. B." are so extremely absurd that the story resolves itself into a huge joke, or the "inventor" into a very lucky man to escape with his life.

Osborne Road, Romford, Dec. 2, 1908. B. Keith Green.

Sir,—It is to be hoped that very few users of petrol gas are ignorant of, or likely to disregard the warning conveyed in, the almost elementary facts which "J. W. B." adduces in his letter in your issue of the 24th of November. There are, however, other dangers of a more insidious character arising from ignorance on the part of professing gas experts, some of whom seem to apply the same, or similar, rules to petrol as they do to coal gas.

In one case of which I am cognizant, the "expert" showed himself quite ignorant of the regulation of air currents and the proportionate distribution of air from an inch pipe through minute openings made in subordinate piping. This he tried to effect by a rule-of-thumb method, instead of using a simple arithmetical calculation, which he apparently could not carry out; otherwise he should have applied it.

The same "expert," in order to admit a larger volume of petrol gas into a Bray's incandescent burner, which was intended to serve as a pilot-light, removed the entire top of the drilled cap on the gas-inlet, instead of slightly enlarging the perforations by reaming, or, alternatively, by increasing their number. The consequence was that when, in course of adjusting the air supply, the gas became somewhat richer than normal, it lit-back through the pipe communicating with the gas-container, and eventually caused an explosion. Had the perforations been slightly enlarged, as is usual, instead of the cap being removed altogether, no explosion could possibly have occurred.

It is in such cases as these, arising from "expert" ignorance, that real danger exists; but lighting by petrol gas can be conducted, under ordinary circumstances, with quite as little danger as coal gas.

Nov. 28, 1908. F. M.

Gas Production in the United States in 1907.—The total quantity of gas produced at coal-gas works and bye-product coke-works in the United States last year, as reported by the 513 companies who made returns to the United States Geological Survey, was 58,096 million cubic feet.

LEGAL INTELLIGENCE.

THE SUPPLY OF LISTS OF SHAREHOLDERS.

High Court of Justice—Chancery Division.

(*Before Mr. Justice* WARRINGTON.)

Last Thursday his Lordship had before him the case of *Davies v. The Gaslight and Coke Company*. As readers may remember, it was an action by the plaintiff for a *mandamus* directing the defendants to supply him with a copy of the shareholders' address-book, in accordance with section 10 of the Companies Clauses Consolidation Act, 1845. The initial proceedings were taken on the 30th of October (*ante*, p. 355); a further stage being reached on the 27th ult., as reported in the "JOURNAL" last week (p. 644).

Mr. H. TERRELL, K.C., and Mr. LAVINGTON appeared for the plaintiff; Mr. ROWDEN, K.C., and Mr. R. J. NEVILLE (instructed by Messrs. Monier-Williams, Robinson, and Milroy) represented the defendants.

Mr. TERRELL, in opening the case, said the form of action before his Lordship was introduced by the Common Law Procedure Act, and was continued by section 25 of the Judicature Act, 1873. It was wholly distinct from the proceedings for a prerogative writ of *mandamus;* it was in aid of a civil right, and depended upon principles analogous to those on which injunctions were granted. The plaintiff was the holder of £100 of consolidated stock of the defendant Company, about which he thought there was no dispute.

Mr. ROWDEN said he could not assist his friend much in this case, but he admitted that the plaintiff was the holder of £100 of stock.

Mr. TERRELL said he could put in the certificate. He then read the sections of the Act of 1845 providing that the company shall keep a register of the names and addresses of the shareholders, and also allow inspection thereof to any shareholder, and furnish a copy of any portion he may require on payment at the rate of 6d. per 100 words. Section 64 also provided that the holders of stock should be entitled to the rights and privileges of shareholders. The plaintiff applied for a copy of the shareholders' address-book, and it was refused.

Justice WARRINGTON asked if the application was admitted.

Mr. ROWDEN said he could not admit anything further. His friend must prove his case.

Mr. TERRELL said he would refer to the letters which had passed between the parties; and if they were not admitted, he must prove them.

Mr. ROWDEN said the letters were not admitted.

Mr TERRELL said he thought he might be met with this objection, and therefore he had subpœnaed the Secretary and the General Manager to produce the letters.

Justice WARRINGTON said the production would not be enough; the signatures to the letters would have to be proved.

Mr. TERRELL said he could prove this when the letters were produced. He then called for the letter of Sept. 29 from the plaintiff to the defendants, and for the application referred to in it, and read these and several others, including letters between the Solicitors.

Mr. ROWDEN said he would admit the latter; but his Lordship would understand why he could not admit the others.

Justice WARRINGTON said he quite appreciated the reason; but it would not extend to the Solicitors' letters.

Mr. TERRELL said the letters made it clear that there was an application under the section, and the writ followed the words of the section. Before calling evidence, he would refer to one or two authorities. It had been held that, a prerogative writ being entirely discretionary, the Court, when a shareholder was applying to see accounts, was entitled to ask what he wanted to see them for. This was because a prerogative writ was only issued when there was no other remedy. But since the passing of the Common Law Procedure Act, and still more since the Judicature Act, the principles which guided the Court in the issue of a prerogative writ had no application. If by Statute or by contract a person had a right to have an act done, he was entitled as a right to a *mandamus*, whatever might be the object for which he desired the act to be done. Two cases made this perfectly clear—*Holland v. Dickson* (37 C.D., 669) and *Mutter v. Eastern and Midland Railway Company* (38 C.D., 92). Both were decisions of Mr. Justice Chitty; and the latter was affirmed by the Court of Appeal. Having read several passages from the judgments in these cases, Counsel said they were clear authorities that the plaintiff in the present case, whatever his object might be, had the rights of a shareholder under the Statute; one of these rights being to have a copy of the register of shareholders on paying the proper charges, and that the Court was not entitled to inquire what his object was. He should therefore ask his Lordship to say, when he had proved his case, that the plaintiff was entitled to the relief he sought.

Mr. *Henry Lavington* was then called. He said he was Solicitor for the plaintiff in this action, had acted for him for some time, and knew his writing well. The signatures to the letters produced were his. His firm issued the writ in this action on the 15th of October, and immediately thereafter notice of motion was served for a *mandamus*. On the 6th of November he had a conversation on the telephone with Messrs. Monier-Williams, Robinson, and Milroy, the defendants' Solicitors, and on the same day wrote a letter, which had been read, which correctly stated the substance of the conversation. The gentleman who spoke to him said his clients understood that what was wanted was a list of the shareholders' names and addresses.

Cross-examined by Mr. ROWDEN, witness said he was acting for the plaintiff in the next case on his Lordship's list. [*Water-Works, Lighting, and Power Investment Corporation v Brentford Gas Company.*]

Mr. ROWDEN asked witness if Mr. Eaton was a Director of the Water-Works, Lighting, and Power Investment Corporation.

Mr. TERRELL objected to the question.

Justice WARRINGTON remarked that Mr. Rowden must convince him, on the authorities, that he could go into any such matter as this.

Mr. ROWDEN said he hoped to do so.

Justice WARRINGTON observed that *primâ facie* this action for a *mandamus* was on the same footing as one for an injunction.

Mr. ROWDEN said he was not at all satisfied as to this. It was a legal point; and, on the authorities, he should certainly submit that the Court would look to see whether reason had been given for the application, and *a fortiori* as regarded the *mandamus*. Counsel then proceeded to argue that it was really the equivalent of the old prerogative writ. Of course, the Directors of the defendant Company did not wish to withhold any documents from anyone who was entitled to them; but they had very carefully considered this matter, and had come to the conclusion that, unless his Lordship made an order, they ought not to supply the information asked for.

Justice WARRINGTON: I will assume that your case is that plaintiff intends improperly, for some motive of his own, to circularize your shareholders. That, I suppose, is what your case is. You say he is asking for the list from some improper motive. The question is whether you are entitled to examine into his motives at all; that is the question. If you are not entitled to do so, it does not matter whether his motive is proper or improper, fraudulent or not.

Mr. ROWDEN said this was what was called in some cases a private *mandamus*, which did not occur very often in the Chancery Division.

Justice WARRINGTON observed that there was very little difference now between an injunction and a *mandamus* of this kind.

Mr. ROWDEN said his submission was, first, that this was not a proper matter for an action for *mandamus;* and, secondly, if it were, such an action would be subject to the same rules as obtained with reference to the old prerogative writ. He relied on *The Queen v. St. Katharine Dock Company* (31 L.T., N.S., 588). He first of all submitted that it was not clear that the action for a *mandamus* under Order 53, Rule 1, was applicable to such cases. He should also submit that there was no question here of private right, and that the statutory or private *mandamus* was not an appropriate remedy. Even if it did apply, which was his second point, the rules with regard to the prerogative writ applied to the *mandamus*. He should submit that it was not a sound view to say that Order 53 merely enabled the Court to grant a positive injunction instead of a negative one, though it might include this; but he should submit that if the principles of prerogative writ applied to this action, two points were important, one being that the Court had an absolute discretion, as was decided by the House of Lords in the Wigan case (1 Appeal Cases).

Justice WARRINGTON remarked that if it was the same as a prerogative writ, it was discretionary; and if the same principles applied to this action as to a prerogative writ, of course it was discretionary.

Mr. TERRELL said he admitted this.

Mr. ROWDEN said his first point with regard to what he called a private *mandamus* was dealt with in the case of *Smith v. Chorley District Council* (1897, 1 Q.B.). The head-note stated that an action for a *mandamus* would not lie to a local authority—that it was a case for a prerogative writ of *mandamus*. In that case the District Council declined to sanction some plans which had been submitted; and the plaintiff commenced his action for a *mandamus* to compel them to pass them.

Justice WARRINGTON pointed out that in that case there was no statutory right given to the plaintiff to have his plans passed. The case was that a public body were acting unreasonably in refusing to pass the plans.

Mr. ROWDEN said he should submit that here there was a right created by Statute, and that the proper remedy, before the passing of the Judicature Act, would have been by prerogative writ. It seemed to him that the St. Katharine Docks case was exactly in point; it was brought on the same Act, though not on the same section. It was not necessary for him to say that the prerogative writ was the only remedy. It had been recognized for many years that it was the appropriate one; and where this was so, he submitted that the new action for *mandamus* did not lie.

Justice WARRINGTON asked why it was the specially appropriate remedy in such a case.

Mr. ROWDEN said it appeared to be so treated in books on *mandamus;* and he cited "Shortt." The second point was that, whether or not a statutory action for *mandamus* would lie, in dealing with an application of the class in question, the introduction of the action was not intended to bring in new principles by which the plaintiff would get every right under the Statute which he would formerly have obtained by the writ. Here came in the discretion of the Court. Having cited passages from the judgment of Lord Justice Kennedy in the St. Katharine Docks case, Counsel said that, at any rate, it was not clear that, this being a public duty—though, no doubt, the performance of it was claimed by an individual—it was the subject of an action for a *mandamus* at all. This was the very essence of the old writ—that it must be applied for in the performance of a public duty.

Justice WARRINGTON asked if there was any case in which a prerogative writ of *mandamus* had been issued to a company to perform this sort of duty.

Mr. ROWDEN thought there were a great many cases. Mr. Justice Blackburn said that where there was no other remedy open to a party, he might apply for a prerogative writ of *mandamus*. There was one case of *The Queen v. Wilts and Berks Canal Navigation*, where the writ was granted, and in another case of *Bush v. Bevan*.

After some further argument,

Justice WARRINGTON said if he had to deal with this case on the same principles as a prerogative writ, no doubt the matter was absolutely in his discretion, and so he must hear all the facts. There was no doubt about that.

Mr. ROWDEN then cited a passage from the St. Katharine Docks case, for the purpose of showing that if it was a prerogative writ there was a wide discretion.

Justice WARRINGTON said this was admitted. The only question was whether he was to treat this action on the same footing as an application for a prerogative writ.

After still further argument,

Mr. NEVILLE addressed his Lordship to the same effect.

Mr. TERRELL having briefly replied,

Justice WARRINGTON gave the following

Judgment.

This is an action by the plaintiff, who has proved that he is the holder of stock in the defendant Company, asking for a *mandamus* commanding the defendants to supply him with "the corporate names and places of business of the several shareholders of the defendant Company, being corporations, and the surnames of the several other shareholders, with their respective christian names, places of abode, and descriptions, so far as the same shall be known to the defendants." The action is brought for the purpose of enforcing this right, which is given to him by the 10th section of the Companies Clauses Act of 1845. This section enacts that "in addition to the register of shareholders, the company shall provide a book, to be called the 'shareholders' address-book,' in which the secretary shall from time to time enter"—and then the particulars which I have just read from the writ are stated—viz., addresses, and so on—"and every shareholder, or if such shareholder be a corporation the clerk or agent of such corporation, may at all convenient times peruse such book gratis, and may require a copy thereof, or of any part thereof; and for every hundred words so required to be copied, the Company may demand a sum not exceeding sixpence." The plaintiff has proved that he applied for a copy of the shareholders' address-book. He alleges, and is prepared to prove, that he has been refused the copy. In order to prove his application for a copy, he calls his Solicitor to prove his signature to certain letters containing his application, and to prove a certain interview with the defendants' Solicitors over the telephone. The defendants then proposed to cross-examine the Solicitor, and they proposed to ask a question which was directed to ascertain what were the motives of the plaintiff in asking for the copy of the shareholders' address-book. An objection was made to the question; and Mr. Rowden, for the defendants, frankly admitted the object of the cross-examination on which he was entering. I thought it right, in order to avoid a waste of the public time, to call on Mr. Rowden to justify this line of cross-examination; for it seems to me that where cross-examination is not directed to credit, but is directed to ascertaining certain facts on which the cross-examining party relies, if it is clear that these facts would be irrelevant, it is then clearly the duty of the Court, to avoid such waste of time, to stop such cross-examination. Accordingly, the defendants have sought to establish that it is relevant to the issue in the present action to enter into the motives of the plaintiff in applying for relief; and the question which I have to determine now is whether the line of cross-examination would be relevant. Now, the way in which it is put for the defendants is this: It is said that this application is one which might have been made in the form of an application for a prerogative writ; that if it had been made in that form the Court would have had an absolute discretion as to the granting of the prerogative writ, and, having regard to numerous authorities, would in that case have entered into the motives of the applicant, and if not satisfied of those motives would, in the exercise of its discretion, have refused to grant the writ. On the other hand, it is said that this is not an application for a prerogative writ, and that it is immaterial whether it could have been made, and whether relief could have been obtained in that form; that it is an action by which the plaintiff seeks to enforce a private right which is conferred upon him by Statute, and that this private right is one which, on the authorities, could certainly be enforced by injunction; and that there is no substantial difference between an injunction, which is an order which prevents a company from doing something which would interfere with the exercise of the private right, and a *mandamus* or mandatory injunction, which commands a company positively to give that right which the plaintiff possesses. In my opinion, on this point the plaintiff is right. I need not read the 10th section again; but I think on the section it is clear that the right which is conferred is one which is conferred upon the plaintiff by reason that he is the holder of stock in the Company. It is a right incidental, therefore, to the property of which he is possessed as the holder of that stock. It is not given to him as one of the public; it is given to him simply as a stockholder in the Company. It is a right which is incidental to his private right of property, and it is therefore a private individual right of the plaintiff, and one with which the public have nothing to do. That this is so, on the authorities with regard to the right of inspection, is, I think, quite plain. I ought to say that it is clearly established that where an injunction is asked for in support of such a private right, there the Court has no title to inquire into the motives of the person who seeks to enforce that private right. Two cases have been referred to. The first of these is *Holland v. Dickson*, before Mr. Justice Chitty (37 C.D., p. 669). The head-note is this: "The right given to holders of stock and debentures by the Companies Clauses Act, 1845, sections 45, 63, and by the Companies Clauses Act, 1863, section 28, of inspecting the registers of a company is not confined to an inspection of the names and addresses only of the holders of stock and debentures"—this is the important point—"may be exercised without assigning any reason for requiring inspection, and can be enforced by an injunction restraining interference by the company with the stockholder in the exercise at all reasonable times of his statutory right without his being compelled to apply for a *mandamus* calling upon the directors to allow inspection." Two points are decided there. The first is that an action of the ordinary description will lie for the infringement of that right of inspection; and the second is that in such an action the motives of the plaintiff are immaterial. [His Lordship read several passages from the judgment in question.] The important part of the judgment is the last sentence, in which it is pointed out that that was not a case (it was only for inspection) in which a prerogative writ would lie, but it was one in which an action would lie for the infringement of a private right. The matter came again before Mr. Justice Chitty in the first instance, and afterwards before the Court of Appeal in *Mutter v. Eastern and Midlands Railway Company* (38 C.D. p. 92). The head-note is: "The right of inspection and perusal of the register of debenture stockholders, which by section 28 of the Companies Clauses Act, 1863, is given to mortgagees, bondholders, debenture stockholders, shareholders, and stockholders of the company, includes a right to take copies. The fact that a person has taken his stock in a company at the instance of a rival company, and for the purpose of serving the interests of the rival company, does not disentitle him to the assistance of the Court in enforcing this statutory right." That raises in a very pointed manner the question of motives. What Mr. Justice Chitty said there was this: "The result of the authorities, I think, now is clear—that, whatever the Court or Judge individually may think of the merits of the applicant, he cannot be denied the rights which the Legislature has conferred upon him as the holder of the stock. The Court may see that the man, though he bought the stock nominally in his own interest, has really taken it in the interest of some other person. But as the company is not bound by any such trust, but can only look, and must look, to the register for the purpose of the liabilities, this applies to the rights of the stockholder himself." He then illustrates what he has been saying by reference to the case of *Pender v. Lushington*, which dealt with the question how far a man's motives might be inquired into with reference to his right to vote, and he again states (p. 96) his view of the matter: "I think the plaintiff is acting to a large extent in the interest of the Great Eastern Railway Company. But it appears to me, on the authorities, that I am not justified in going behind the register. Even if I came to the conclusion that I did not like the position of the plaintiff in this particular matter, I should have no right to refuse to do him justice or accord him the rights which the Legislature has given him. The argument, therefore, as to 'personal exception' to the plaintiff fails." The matter came before the Court of Appeal, and the Judges of that Court dealt more particularly, I think, with the right to take copies. But there are some observations in Lord Justice Lindley's Judgment to which I ought to refer. [His Lordship quoted several passages.] The conclusion the Court came to was in accordance with that to which Mr. Justice Chitty had come. It seems to me quite clear that if the plaintiff had merely asked here for an injunction restraining the Company from refusing to allow him to inspect, the Court would have had no option in the matter; and, on his proving that he was a shareholder, and that the Company had refused to allow inspection, would have been bound to grant an injunction restraining them from continuing that refusal. Now, is there really any difference between that case and the present one, where the relief which the plaintiff asks is that the Company may be directed to deliver him copies? So far as the section is concerned, I can find no distinction at all. The right to obtain a copy on paying proper fees is as much incidental to his ownership of the stock as his right to obtain inspection; and I think it is extremely doubtful—I say no more than that—whether, having regard to the decision in the case of *Reg. v. Lambourn Valley Railway Company*, an application for a prerogative writ of *mandamus* would have lain at all. But assuming that it would have lain, am I bound to treat this application for a *mandamus* in an action on the same footing as I should have had to treat a prerogative writ? I think I am not. Assuming that an action for *mandamus* would lie—and as to that I entertain no doubt at all, for the reasons which I have mentioned, namely, that it is intended to enforce a right incidental to a private right of property—I think I am certainly not bound by the rules which governed the old Court of Queen's Bench in an action on a prerogative writ of *mandamus*. [His Lordship cited a passage from a judgment of Mr. Justice Day in *Baxter v. London County Council*, 63 L.T.] I think it is made quite clear what is the distinction between a prerogative writ and a *mandamus* granted in an action brought to enforce a certain private right. Much reliance was placed on the case of *Smith v. Chorley District Council*, in which the words of Mr. Justice Day were quoted. But that was a case which was clearly one to which the prerogative writ of *mandamus* was applicable; and Mr. Justice Kennedy decided there that it was not one in which an action could be brought. It was an action brought not to enforce a private right, but to compel a public body—the District Council—to perform its public duty; and it was on this ground Mr. Justice Kennedy held that the action for a *mandamus* would not lie, and that a prerogative writ ought to be granted. In the present case, I am of opinion, on the two authorities of *Holland v. Dickson* and *Mutter v. Eastern and Midlands Railway Company*, that the action will lie. I can find no distinction in principle between granting an injunction to restrain a company from interfering with the right, and granting an affirmative order compelling a company to grant the right. On these grounds I think any inquiry into the motive of the plaintiff would be irrelevant, and I must therefore not allow the questions which Mr. Rowden proposed to put.

Mr. ROWDEN said he had no further questions to put to the witness, and he would admit that the plaintiff was a stockholder, to save time. He should like to put the Chairman of the Company into the box, but was afraid that, on the question of the admissibility of evidence, he had really argued the case.

Justice WARRINGTON said he should have to rule that it was irrelevant. He would take it that evidence was tendered to show what motives the Company had for refusing, and he refused it. After what had been said, there was no doubt that a great Company like the one in the present case refused in the *bonâ fide* belief that the plaintiff's motives were not proper.

Mr. ROWDEN said that was the position he took up. He formally tendered the evidence, but it seemed to him to be covered by what his Lordship had decided.

Justice WARRINGTON said he must give judgment for the *mandamus*, with the costs of the action.

His Lordship then proceeded to hear, for Mr. Justice Eve, the next case on the list—*Water-Works, Lighting, and Power Investment Corporation v. Brentford Gas Company*—in which the same point was raised as in the previous action. The Counsel already named, with the exception of Mr. Rowden, K.C., appeared for the respective parties.

Mr. TERRELL said this was an action by a shareholder against the Brentford Gas Company for the same relief as that claimed in the last case. The Solicitor to the defendants (Mr. Griffiths) wrote on the 26th of October saying that the Company were willing to abide by the decision in the action against the Gaslight and Coke Company.

Justice WARRINGTON said, as a matter of form, he supposed he must take it that similar evidence would be tendered.

Mr. NEVILLE said the offer that the case should be decided by the former one was not accepted; and as the action had been brought, he had a short point to submit—that the plaintiff was not a "shareholder"

within the meaning of the Act. The offer which had been read was made on the footing that an action should not be brought; but the plaintiff had issued the writ, and therefore he (Counsel) was entitled to defend it. He admitted that the plaintiff was the holder of £1 of stock of the defendant Company; but his point was that he was not a shareholder. The capital of the Company was originally £30,000, in shares of £50 each; but subsequently £20,000 more capital was issued, in shares of £25 each. Then, in 1858, the Company obtained an Act for the purpose of converting the shares into stock; each £50 share being entitled to stock to the value of £78, and each £25 share to the value of £39. Consequently, the only shares that would be dealt with by the Companies' Clauses Consolidation Act must be shares which were of £50 and £25 nominal value; and these were subsequently converted into stock, as he had stated. The plaintiff had only £1 of stock; and therefore he could not be considered a "shareholder." The Act set forth, in section 10, that every shareholder was to have the right to a copy of the address-book; and section 3 defined a shareholder. Section 61 provided for the consolidation of shares into stock; section 63 enacted that a register of the shareholders should be kept; and section 64 was as follows:

> The several holders of such stock shall be entitled to participate in the dividends and profits of the company, according to the amount of their respective interests in such stock; and such interests shall, in proportion to the amount thereof, confer on the holders thereof respectively the same privileges and advantages for the purpose of voting at meetings of the company, qualification for the office of directors, and for other purposes, as would have been conferred by shares of equal amount in the capital of the company, but so that none of such privileges or advantages, except the participation in the dividends and profits of the company, shall be conferred by any aliquot part of such amount of consolidated stock as would not, if existing in shares, have conferred such privileges or advantages respectively.

Now, it was impossible that there could be a share of £1; and £1 of stock, therefore, could not possibly confer the rights which belonged to a "shareholder."

Mr. TERRELL and Mr. LAVINGTON argued at some length that the latter part of section 64 did not apply, and that the plaintiff was entitled under section 10 to the relief claimed.

Justice WARRINGTON then gave the following

Judgment.

This is an action for the same purpose, and is in every respect the same kind of action, as the one against the Gaslight and Coke Company with which I have just dealt. In this particular case, the plaintiffs are the holders of only £1 of stock; and the question is whether the holder of this amount of stock is entitled to the privileges and advantages conferred upon a shareholder by section 10 of the Companies Clauses Consolidation Act, 1845. Section 3 of the Act defines the word "shareholder" and a number of other expressions used in the Act, and provides that they shall have the meanings assigned to them unless there be something in the subject or the context repugnant to such construction. A "shareholder," subject to this restriction, is defined to mean "shareholder, proprietor, or member of the company." In section 10, the person who has the right to a copy of the shareholders' address-book is, in terms, a shareholder; and unless there is something else in the Act which says that, used in reference to this subject, the word "shareholder" does not include the holder of £1 of stock, I should have to say that the holder of such an amount of stock is a member of the company, and is therefore within the definition of "shareholder." But it is pointed out that there is in the same Act a section which shows that, under such circumstances as those which exist in the present case, the expression "shareholder" in section 10 does not mean every holder of stock, however small may be the amount. The question arises in this way: The shares of the Company at the date of the passing of the Company's Private Act in 1858 were of two kinds—£50 shares and £25 shares. By the Act of 1858 the share capital was turned into stock; and by section 23 it was provided that of this stock a certain part should be vested in the several persons who immediately before the passing of the Act were the holders of the 750 shares of £50 each created and issued by and under the first recited Act, and they were vested in them respectively in the proportion of £78 of stock for one share. The £78 of stock therefore represented a £50 share. By section 34 exactly the same thing was done with reference to another class of shares, except that in this case they were £25 shares, and the stock was to be at the rate of £39 for every £25 share. Then I come to section 64 of the Companies Clauses Act, which deals with the conversion of shares into the stock and the rights of stockholders, and that provides this: "The several holders of such stock" (that is, the stock representing and into which the shares are consolidated) "shall be entitled to participate"—by the way, this Act is incorporated into the Act of 1858—"in the dividends and profits of the company, according to the amount of their respective interest in such stock; and such interests shall, in proportion to the amount thereto, confer on the holders thereof respectively the same privileges and advantages for the purpose of voting at meetings of the company, qualification for the office of directors, and for other purposes, as would have been conferred by shares of equal amount in the capital of the company." Then comes this most important proviso: "But so that none of such privileges or advantages, except the participation in the dividends and profits of the company, shall be conferred by any aliquot part of such amount of consolidated stock as would not, if existing in shares, have conferred such privileges or advantages respectively." It is quite plain that at the date of the passing of the Act of 1858 no holder of anything less than £25 could have enjoyed the privileges or advantages given by section 10; and it seems to me that, this being so, no holder of any stock of less than £25 value—whether it extends to £39 or not I would rather not say, but no holder of stock of an amount less than £25, at any rate—can enjoy any of the privileges or advantages which would not have been enjoyed by a shareholder holding less than £25. The plaintiff in this case is a stockholder of £1. He could not have had any interest in shares amounting to £1 only—that is quite plain; so that it seems to me that, this being so, no holder of so small an amount as £1 can enjoy the privilege which is given by section 10; and therefore in this case the action must fail. It was attempted to make out that the words "and for other purposes" must be read *ejusdem generis* with the words which immediately precede—viz., "for the purpose of voting at meetings of the company, qualification for the office of directors." But I can see no reason for so narrowly confining the words. The provision as I have interpreted it is perfectly reasonable; and it may well have been the intention of the Legislature that a person holding a small amount of stock less than the nominal amount of one share in the Company should not be entitled to the special privileges and advantages which are given by section 10. I think in this case the plaintiffs' action fails, and there must be judgment for the defendants, with costs.

Unlawfully Connecting a Gas-Meter.

At the Oldham Police Court, a few days ago, Michael Clune was summoned by the Corporation for having unlawfully connected his gas-pipe with a meter. The Deputy Town Clerk (Mr. Garside), who prosecuted, stated that on Oct. 14 defendant applied to the Gas Department to have the gas-meter on his premises connected with the pipes. An inspector went to the house, and examined the gas-fittings, but found that they were not satisfactory. He was therefore compelled to refuse to connect the meter. It appeared from inquiries that a plumber had been authorized to put matters right. On Oct. 24, another notice was given to the department that the fittings had been made right; and the inspector went on the following Monday to connect the pipe. He found that this had been done, and 400 cubic feet of gas consumed. The inspector did not see the defendant then; but his wife said he had connected the pipe. The defendant admitted doing it, but said he did not think he was doing anything wrong. He could not do without gas. Mr. Garside said the prosecution did not suggest that defendant did it with intent to defraud; but the Corporation could not allow consumers to connect and disconnect their meters. The Bench decided to dismiss the summons.

Illegal Connection of a Service-Pipe.

At the North London Police Court last Wednesday, before Mr. Biron, Mr. J. B. Kyffin, a property owner in North-East London, was summoned, at the instance of the Metropolitan Water Board, for an infringement of the regulations in causing one service-pipe to serve two houses. Mr. Collins, who appeared for the Board, said the High Court of Justice had held that every house must have a separate pipe unless the Board consented to the dual service. Mr. Kyffin said the supply was cut off from one house on or about April 12, 1907, and within a few days the water was supplied by a connection being made, at his (Mr. Kyffin's) direction, to the pipe of the next house. The summons charged him with making the connection between Jan. 24 and May, 1908. He contended that the six months' limit imposed by Jarvis's Act applied, and that the Board were out of time in their proceedings. Mr. Biron said the offence was a continuing one; but he thought the justice of the case would be met by a nominal penalty of 5s., with £1 1s. costs. A second summons, involving the same facts, was dismissed. Mr. Kyffin asked his Worship to state a case for the opinion of the High Court; but he declined to do so.

Unfounded Claim against the Chester Gas Company.

At the Chester County Court, last Friday, before his Honour Judge Moss and a Jury, Mrs. Catherine Weston claimed £10 damages from the Chester Gas Company on account of illness caused, as she alleged, by gas escaping from a defective main. Mr. W. A. V. Churton, who appeared for the plaintiff, said there was no dispute about the gas escaping from the Company's mains and finding its way into the sewers, where it combined with sewer gas, and, issuing into the air, caused the plaintiff to contract septic sore throat. Mrs. Weston was called, and said there was a very bad smell in the middle of July last, and it became worse. Early in October she suffered from sore throat, and attributed it to the smell, which was not in her house but in the street. Dr. Blagden said sewer gas was a recognized cause of tonsilitis; and he inferred that this gas was the cause of plaintiff's illness. He had never heard it suggested that coal gas, however disagreeable, caused septic sore throat. Mr. Sellers, who appeared for the Company, submitted that there was no case to go to a Jury, according to the evidence of Dr. Blagden. His Honour said there was nothing to connect the defendants with plaintiff's illness; and he nonsuited her.

Charge of Stealing Gas.—William Thomas Russell, 47, a laundry proprietor of Twickenham, was last Friday committed for trial at the Middlesex Sessions on a charge of stealing gas at his premises at Brentford. It was stated that the accused had very ingeniously disconnected the main and service pipes from the meter, and passed the gas direct into the house. Evidence was given to the effect that in 1903 prisoner was sentenced to five years' penal servitude for being in possession of coining implements, and that there were then previous convictions against him.

Conviction for Selling Spurious "Veritas" Mantles.—At the Clerkenwell Police Court, on the 27th ult., Mr. J. S. Himmel, of Essex Road, Islington, was summoned before Mr. d'Eyncourt for selling gas-mantles falsely described as "Veritas." The defendant was called, and denied the charges; and it was contended by Mr. Coombe, on his behalf, that the evidence was not sufficient to prove that the spurious mantles came from his shop. In any case, it was urged that he had acted innocently. His Worship, however, imposed a fine of £7 and £7 7s. costs, or two months' imprisonment.

Preventing Inspection of a Gas-Meter.—At Kingston, last Thursday, Mr. R. W. Wright, of Manor Road, East Molesey, was fined 5s. and ordered to pay £1 9s. 6d. costs, for refusing to allow officers of the Hampton Court Gas Company to inspect the gas-meter in his house. Witnesses deposed to calling at the house to see the prepayment meter, and to being refused admission. Defendant denied barring the door to the Company, but said he had his furniture on the hire system, and as the owners wanted to take some of it away he told his wife to keep the door shut to everybody. He agreed to give the Company access.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

Mr. Charles Carpenter Elected a Director.

An Extraordinary General Meeting of the South Metropolitan Gas Company was held last Thursday, at De Keyser's Royal Hotel, Victoria Embankment, for the purpose of electing a Director in the place of the late Sir George Livesey. Mr. ROBERT MORTON, the Chairman of the Company, presided over a crowded attendance of proprietors.

THE SECRETARY (Mr. F. M'Leod) read the notice convening the meeting.

THE LATE SIR GEORGE LIVESEY—VOTE OF CONDOLENCE WITH LADY LIVESEY.

The CHAIRMAN said: Ladies and Gentlemen,—You have heard the notice convening the meeting read by the Secretary. Your special attention will be called to the part which relates to the election of a Director. Before that is done, however, I am sure you will all expect me to refer to the circumstances which render this meeting necessary. The proprietors of the South Metropolitan Gas Company have never before, I think, met under such sad and unwonted circumstances as you do to-day. We meet under the shadow of a great loss. You have been accustomed to look forward to general meetings of the Company with keen anticipation of something well worth listening to from the chair, and which you never failed to appreciate. The voice which then held you is now still. The removal of your honoured Chairman has left a blank, which I feel it is more than we can expect to see so filled again. Much testimony, both oral and written, from all parts of the world and by all classes, has, during the last two months, been borne to the high character and great worth of Sir George Livesey. There remains one standpoint from which nothing has been said publicly, and on which I should like to speak briefly—that of the Board-room during the conduct of ordinary business. I have heard that this has been somewhat sarcastically called a "one man" Company—a derogatory saying, which gives an entirely erroneous idea of Sir George's bearing towards his colleagues and of their importance to the Company. I need hardly say that this is an outside point of view, probably begotten of envy; and though, in one sense, there was truth in it, it did not appear at all in the Board-room. That Sir George could be masterful when the occasion demanded immediate show of power, is true; but such occasions do not arise at Board meetings. What his colleagues did see, and admire, too, in him was not a masterful, but a masterly mind. His long and intimate knowledge of the Company and its workings was invaluable, as was also his wonderful memory. He brought well-thought-out schemes before the Board, courted criticism, and was forward to adopt any suggestion that seemed likely to better the project under discussion. And now, knowing him as you did, and the splendid results of his labours, you will, I am sure, agree that his colleagues acted wisely in giving him their hearty support and loyally following his lead. He will long be missed from our councils, but never forgotten. With a view of perpetuating Sir George's memory, a widespread desire has been expressed among the officers and men of the Company to have a memorial statue in bronze erected in the Old Kent Road works. The Directors have encouraged the idea, and hope soon to see something done in this way worthy alike of the man and of the Company. This will entail a considerable outlay beyond the subscriptions of the Directors and employees; and, believing that the shareholders will desire to participate in the pleasure of providing such a memorial, an opportunity will be afforded you of doing so, by circular in due time. This much from this side of the table. From the other side, a notice has been given by Mr. Hounsom, a well-known shareholder, that he purposes to say a few words regarding Sir George, and to make a motion. This will be seconded by Mr. Howlett, also well known to you, and supported by Mr. Beard, the Chairman of the Workmen's Section of the Co-Partnership Committee, and probably by a few others. After this we shall take up the business part of the meeting.

Mr. W. A. HOUNSOM then proceeded to move the adoption of the two following resolutions: (1) "That the proprietors record their sense of the immeasurable loss the Company has sustained by the decease of Sir George Livesey, whose association with the undertaking dated from his earliest years. They recognize that, amidst the varied and ever-increasing demands on his time and energy, this Company had always the first place in his thoughts, and the first claim on his unsurpassed knowledge and advice. They look back with grateful pride to the masterly conduct of the gas industry in South London—to amalgamations resulting in the South Metropolitan Gas Company as it exists to-day, to the reconciling and federating of the interests of capitalists and consumers through the sliding-scale, and to the successful crowning of his work by the introduction of co-partnership with its far-reaching benefits. In respect to every detail, the Chairman was always to the fore, anticipating and overcoming difficulties, undismayed by defeat, unspoiled by victory. Great ideals were his, many of which happily he was spared to see realized. His memory and influence will be an abiding power in the administration of the affairs of the Company." (2) "That the Secretary be desired to convey to Lady Livesey the deepest sympathy of this meeting, and to express the earnest hope that, amid the great sorrow, some consolation may be hers in the thought of the magnificent work faithfully wrought with such cumulative results for good by Sir George Livesey." He remarked that when it was suggested he should undertake this duty, he turned to the last letter he received from Sir George, referring to a meeting. It was written in the early days of this year, and wound up with the following postscript: "Another reason for not attending the meeting is that as I get older I have more work to do, and therefore must avoid all that is unnecessary." This was characteristic of the man. Under an illness which would have necessitated the retirement of many men, he turned himself once more to the great work of his life; and after the three score years and ten had passed, there he was at the fore, as he said in the letter, with increasing work to do. Of course, much might be said of Sir George's work outside the Company; but at this meeting their duty was to look at what he had done for this particular undertaking. Sir George was born in the midst of the industry with which his life-work was associated. It would be difficult to conceive of the time when he was unacquainted with gas in its manufacture, storage, distribution, and use; and he was born in the strenuous times. Gas was not then the necessity of life that it was to-day. There was competition and jealousy. The initial stages had hardly been reached—certainly not passed; and doubtless much of Sir George's success might be traced to his upbringing, to the strain and stress of his early years. Efficiency was necessary; but with that efficiency was always economy, and economy of the most stringent description. The result was he never spent 19s. when 18s. 11d. would do; nor did he tolerate mahogany when yellow deal would answer as well or better. He never sought for show, but always for solidarity; and so to-day they reaped from his great experience. He believed in theory, but in theory subordinated to practice. No doubt he dreamt dreams and saw visions, but dreams that became realities and visions that took concrete form. This was the man whose loss they so deeply deplored, and the results of whose activities had been so far-reaching. The interests of the shareholders and the consumers had been reconciled by the sliding-scale; next the consumer was taught that it would be good for him if he became a proprietor; and then came the great co-partnership system which had done so much for the workers of the Company, and which they rejoiced to know was spreading. He was convinced that this co-partnership movement would be one of the most lasting memorials that could be imagined in memory of Sir George. He fancied that Sir George, in all these things, realized, as perhaps very few men had done, the altered conditions of the present time. The workman and his master were getting asunder. There was no longer the old feeling of federation; and to meet this change he constructed his great scheme. Sir George took his place among the great leaders of their times—the great Captains of Industry. He was already enthroned among those they were proud to own as their countrymen. Passing to the second part of the resolution, he said he had always admired the increasingly domestic character of the Company; and he thought, because of this domestic character, they might venture very respectfully to send on to Lady Livesey their deepest sympathy. They crossed with softened footfall the threshold of that home whence the master had gone never to return; and he was sure that he would be false to his own position, and false to the feeling of the meeting, if he did not touch one fuller note as they approached Lady Livesey, and speak with all reverence of the religious side of Sir George's character. He was no arm-chair Engineer, and he was no arm-chair Christian. The great principles which dominated Sir George's life they rejoiced in, and he (the speaker) trusted that his example would induce many others to follow in his footsteps.

Mr. GEORGE HOWLETT, in seconding the motions, remarked that it had been his privilege to know Sir George for about fifty years. In his early days he was connected with him in a good many movements for the uplifting of the people in the South of London especially, in which Sir George was an earnest worker. He was not what the world called a great orator; but he was a man of homely eloquence, and his words were practical. His advice and his whole life did a great deal more for these people than did the more showy orators. They believed him, they respected him, and they followed him. That day, however, they had to discuss his commercial qualities in connection with this great Company. Mr. Hounsom had already mentioned the sliding-scale. Many of them could remember when this was brought forward; and it had proved a big blessing to the industry and to the shareholders. They came next to the great act of his life—the co-partnership scheme in which they were all bound up. He could call to mind when this was introduced the criticism and the opposition and the sneers which greeted it. Many men looked askance at it—and good men too. They were not all captious critics. They criticized it, and said "It looks well on paper and to talk about, but wait till times of stress and difficulty come, when the price of gas goes up and bonuses come down; then you will see a great difference in the aspect of this question." Well, they had passed through times of stress and difficulty, and yet they had seen the men work cheerfully and the scheme a success. This great scheme would have to go on, if only in memory of the man who had successfully brought it about. But it was more than a memory now. It was a great practical scheme—the greatest scheme, perhaps, in their time—for the commercial and industrial peace of this city of theirs. So far as those on the other side of the table were concerned, he had no fear that the scheme would not go on. The Chief Engineer and the late Secretary, Mr. Bush, and all the other Directors, had taken a great interest in it and supported it. They would do their part to perpetuate and carry the thing on; but if it was to be a real success, it would be the employees who would have to keep it going. It was by their intelligent interest, their conscientious work, and their determination that the scheme would succeed. It had succeeded, and he was sure it would continue to succeed. Other companies had been watching and waiting; but at last they were convinced that this scheme was the one great landmark of the commercial peace of the country, and one by one they were coming into line. He believed the future would see a great many adherents to profit-sharing. Theirs was not a "one-man" company; but there was one masterly man at its head whose influence, courage, and bull-dog pertinacity in all that he thought right was such that commanded men to follow where he led. Sir George would be remembered as a great man. There were thousands of men and women who would bless him as long as they lived; and there were myriads of children as yet unborn who would bless him in consequence of what he had done. He died as he had lived, a right good man. His benefactions were many and various—how various and how many the world would never know. He (the speaker) was not unmindful of the second resolution—that referring to Lady Livesey. They all knew the sorrow that was in her heart. They knew she stood beside Sir George in all the trials, successes, and failures (if he had any) of his life; and they could only echo the words of the motion—that their sympathy went out to her. In her great sorrow she would have the consolation of knowing that thousands of people were blessing Sir George for the good he had done.

Mr. W. BEARD, in supporting the propositions, remarked that he felt it a great privilege to stand there and add his appreciation to what had been said about the life and work of Sir George. He thoroughly endorsed every word that was contained in the resolutions and that had been said. It was only natural that what appealed to the employees were the great benefits he was never tired of bestowing upon them as workers in the Company—above all for the great scheme of co-partnership which took so much of his time and energy during the last twenty years. They all knew the faith he had in this great movement; and the question that they asked themselves now was whether this faith was justified. Events proved that it had been more than justified. The figures showing the amount of savings, and so on, of the men spoke very plainly; and this was only one side. There was another side which had always appealed to him more than the monetary aspect—he referred to the moral standpoint. He entered the service of the Company some 23 years ago; and at that time men in gas-works merely existed—they had nothing to look forward to. This, however, had all been altered now; co-partnership had been an education to the men. There was good in every man; and this scheme had been the magnet which had drawn out the good. A great number of the men were to-day living out their lives on a higher level than they did before. The seed which Sir George sowed twenty years ago had taken firm root, and had brought forth a tree which was bearing fruit. When the co-partnership system spread all over the world, labour warfare would cease. If they did all they could to forward this system, such a memorial would be set up to Sir George as would be everlasting—a memorial such as no man ever had before. As to the vote of condolence, little need be said. Every worker in the Company felt the deepest sympathy with Lady Livesey. If theirs was a great loss, what must hers be? They all hoped she might be upheld and comforted in this time of trouble.

The CHAIRMAN: I have listened with great interest, as you all have done, to what has been said; and I will now put the motions.

The resolutions were carried unanimously; the shareholders rising in their places.

MR. CARPENTER ELECTED TO THE BOARD.

The CHAIRMAN: We now come to the really business part of the meeting, which is to elect a Director to fill the vacant seat on the Board; and I have much pleasure, as well as confidence, in proposing Mr. Charles Carpenter—the only fully qualified candidate—as one well fitted for the post. Mr. Carpenter has been long connected with the Company. He has a capacity for hard work possessed by few; and by his diligence and strict attention to business he has earned the confidence and esteem as well of his fellow officers as of the Directors. Sir George had a very high opinion of Mr. Carpenter; and after he was laid aside, about a fortnight before his death, I think, I had an opportunity of considerable talk with him. I was sorry that he taxed his strength to say as much as he did; but it was all with regard to the Company. He spoke very freely as to what would happen when he was taken away—he was not then looking forward to rising from his sick-bed—and he referred to Mr. Carpenter and a great many others whom I need not mention. I say no more at present, but move that Mr. Carpenter be elected to the vacant seat on the Board.

Mr. J. EWART: I have much pleasure in seconding the resolution; but before doing so, I should like to say a word in support of what the Chairman has said as to the relations of Sir George Livesey with his colleagues. When I joined the Board twenty years ago, I was struck with the care he took to explain carefully the meaning of all questions which arose before the Board—especially those of a technical nature. It was the same with regard to all matters of importance that came forward. He was always most careful to ascertain the views of each individual member of the Board before resolutions were put; and in every way he was most courteous to his colleagues in both large and small matters. In all these years, I am not aware any really serious difference took place among us. I have served on many Committees and Boards, but never on a more harmonious one than that of the South Metropolitan Company. I hope this state of affairs—and I see no reason why it should not—may always continue. I have given some considerable and anxious thought to the question of a successor to the late Chairman; and I am quite sure that in Mr. Carpenter we have a combination of the qualifications required. He stands in the forefront of his profession as an Engineer. He has always been on good terms with the men and with his colleagues; and that he is a good business man is shown by the many negotiations he has carried out on behalf of the Company. Further, he has had experience, I may almost say, as a member of the Board, for since he has been Chief Engineer he has attended all our Board meetings.

Mr. FRANK BUSH: I have great pleasure in supporting the resolution, for it gives me the opportunity which I desire of saying a few words with regard to the great loss that the Company has sustained by the death of our beloved friend the late Chairman. When we remember that on Aug. 12 last he addressed the shareholders in this room from the chair with his accustomed vigour, it seems almost impossible to believe that we shall hear his voice no more. For sixty years he laboured for the Company, with untiring energy, and with unselfish devotion; and its present prosperity is in large measure due to his efforts. He was a man who never sacrificed his convictions; and holding to them often brought him unpopularity. But he did not mind that, for he patiently and persistently persevered until he overcame all opposition; and he was rarely in the wrong. In fact, his failures were few, his achievements innumerable; and he has left behind a name and a reputation which few can ever hope to equal, none surpass. He was an altruist in the best meaning of the word; and the working classes will never cease to love him. I am not using the language of hyperbole when I say that the country is the poorer for his death. (Hear, hear.) In fact, it is a national loss. Personally, I owe him a deep debt of gratitude for many acts of kindness extending over a great number of years; and I shall always cherish the remembrance that to the end I retained his confidence and affectionate regard. It now rests with us to carry on his work; and I am sure we shall go forward with courage and determination to be true to those traditions and those principles which he has handed down to us. Now I come to the resolution before the meeting. It is an open secret that if Mr. Carpenter be elected a Director to-day—as I believe he will be unanimously, and with acclamation—he will be appointed to fill the higher position of Chairman; and I am convinced that he will continue the policy of his illustrious late Chief, and follow in his steps. If I were not so convinced, I should not be speaking on his behalf to-day. I had thought of giving you a brief outline of Mr. Carpenter's career with the Company. For 35 years he has been connected with the undertaking. Starting at the bottom of the ladder, he filled various positions; and in 1884 he was appointed Engineer of the Vauxhall works, which was then the second largest manufacturing station. In addition to these duties, in 1896 he was appointed deputy to the late Mr. Frank Livesey; and on the death of that gentleman, he was made Chief Engineer of the Company. He has filled that responsible position with honour to himself and with great advantage to the Company. He possesses many qualifications that go to make a successful Chairman. He has initiative, the power of organization, and inventive genius—for we have not forgotten, and the gas industry has not forgotten, the invention of the Carpenter burner for the testing of gas. I need not allude—for the Chairman and Deputy-Chairman have done it so gracefully—to Mr. Carpenter's qualifications as an Engineer. But, further, Mr. Carpenter is in the prime of life. So that we may be quite certain his mind is not padlocked against the intrusion of new ideas. I need not say that in a long and very pleasant friendship I have always found him a careful and cautious man, and one who does not hastily arrive at a conclusion. For these reasons, I heartily support the resolution.

The CHAIRMAN: I rise to formally put the motion. I do not think I should say anything more at the present moment.

The resolution was at once carried unanimously.

The CHAIRMAN: You are unanimously elected, Mr. Carpenter; and I think it is a very wise resolution of the proprietors, and congratulate you upon it. You may have something to say.

Mr. CARPENTER: I should be a very unemotional man if I were not deeply moved by the proceedings to-day. I do not think the shareholders of this Company can ever have had a more responsible task than in choosing a successor to him who has gone from us—that great star which shone, not only over the gas industry, but over Great Britain, and beyond the seas as well; and I do not think the Board of Directors can ever have had a greater responsibility put upon them than in selecting from among themselves a Chairman to take the place of that brilliant and untiring genius who has raised the Company to the position it now occupies. I feel it is a happy augury that the selection by yourselves of a representative, and by the Board of a Chairman, should fall upon the same person; and I accept that honour with regret, but not with dismay. I accept it with regret, because I cannot forget the fact that the happiest day of my business life was when, after 25 years of service with the Company I entered as a boy, I rose to the top position in my profession by being made your Chief Engineer; and I very sorrowfully realize that to-day I must give up that position. I relinquish it with great regret. But I am consoled by this thought—that I am sure you will not expect to see in me another Sir George Livesey. You will expect to see one following in his great traditions; and there I hope you will not be disappointed. These traditions we may consider in their relationship with the shareholders, with the consumers, and with the employees. I am sure Sir George can never have had the interests of the shareholders more at heart than the day when he formulated the co-partnership scheme. He must have foreseen that Socialism was becoming more and more antagonistic to true industry, and that, particularly as regarded our own industry, competition was taking the place of monopoly; and he equipped this Company in the manner he did with the means to combat all that. With regard to the consumers, no man was ever more mindful of the duties of the Company with reference to them, whether they were large or small. He never sacrificed the interests of the prepayment-meter user, of the small shopkeeper, or of the humble clerk, to those large users of gas—those big corporations and undertakings—who were in a better position to make bargains for themselves. He was ever anxious to promote the use of all appliances for the economic consumption of gas—no matter what the effect of them might be on the gas bills. Then with regard to the employees, I can never find words to tell you, and you will never know, the great influence his work has had upon them. I am quite sure that the Company could never do what it has to do, and never work in that harmonious spirit in which it has been working, but for that great influence; for Sir George not only won the labourers' labour, but he won their hearts and their goodwill. I have said that I regret the coming of the time when I am to be no longer Engineer; but in the ten years that I sat at the same table with Sir George, I may truthfully say I enjoyed his confidence and his friendship. He often said to me: "You will have to carry on this work when I am gone." My qualifications for doing it—I think the best and most important—are the traditions that he handed on to me. I think they are the best qualifications I possess that will enable me to accept the position of the future leader of the Company; and I can truthfully say this—that it will be my desire to maintain those traditions and the integrity of the Company which he did so much to raise up to the level at which it stands to-day, and the course of which he guided so carefully and so successfully to its present position. I thank you very heartily for your election of me to the Board to-day. (Applause.)

The CHAIRMAN: I said I should have a few remarks to make after Mr. Carpenter. I do not know that I really need say anything now. Vulgarly speaking, "the wind has been taken out of my sails." I had purposed to tell the shareholders what has already been announced by Mr. Bush and spoken of by Mr. Carpenter. I would just like, however, to say that, in discussing matters with Sir George immediately before his death, he said: "Of course, you will be Chairman." I said: "I suppose, being Deputy-Chairman, I will be Chairman in the meantime; but that cannot possibly be for very long." I do not feel physically equal to the duties; and it was my intention to announce that now. It has been announced already; so that I need not say anything more. But it was an honour I felt, coming from my colleagues, to elect me Chairman; and I accepted the position with the understanding that as soon as possible after Mr. Carpenter was elected a Director, arrangements should be made for his taking my place. That was all I had to say; and I thank you for your attendance here to-day.

GAS CO-PARTNERSHIP.

The Annual Meeting of the Labour Co-Partnership Association was held last Tuesday at the Church House, Westminster, S.W., under the chairmanship of Mr. D. J. Shackleton, M.P., the Chairman of the Parliamentary Committee of the Trade Union Congress. The principal speakers on the occasion were the Right Hon. A. J. Balfour, M.P., Sir Christopher Furness, M.P., Professor A. C. Pigou, and Mr. Amos Mann. Mr. Balfour is the President for the year; and his eloquent and well-reasoned address was listened to by an audience which filled the capacious hall of the Church House. Among the audience were several gentlemen—directors and officials—who are associated with the co-partnership movement in the gas industry. The address (our report of the main features of which appears on an earlier page) provides much food for reflection on the all-important question.

The report of the Association submitted by the Secretary (Mr. Henry Vivian, M.P.) contained the following references to the position of co-partnership in the gas industry:

"The co-partnership schemes being carried on by private firms or companies have without exception, we believe, prospered during the year. The most encouraging feature, however, during the year, has been the extension of our principle in the gas industry. Six important Gas Companies have initiated co-partnership schemes during this year—in other words, the number of such Gas Companies practising co-partnership has been doubled.

"Since the period with which this report deals, one whose name must for all time be associated with co-partnership—Sir George Livesey—has passed away; his death having taken place at Reigate on Oct. 4. Born at Islington in 1834, he entered the service of the South Metropolitan Gas Company when only fourteen years of age. In 1885, he became Chairman of the Company. In 1889, he introduced his now famous scheme of profit-sharing. In 1894, the scheme was modified in the direction of giving special encouragement to employees to invest their profit in the stock of the Company, and later still provision was made for the employees to elect three Directors on the Board. At the time of his death, the employees owned £363,367 in the capital of the Company. It is not too much to say that we owe to his public spirit, foresight, and enthusiasm, our greatest co-partnership experiment. The feeling associated with the inauguration of the scheme has gradually passed away, and seldom has the head of a great enterprise been able to win, in such a remarkable degree as Sir George Livesey, the affection and loyalty of those whose duty it was to serve under him.

"Following the custom of previous years, we give the latest figures concerning the progress of co-partnership schemes among Gas Companies. For the year ending June, 1908, the total sum credited to employees was £44,926, and the aggregate amount since the schemes were adopted £496,879. The 7138 employees held at the end of June, 1908, £437,713 in the capital of the various Companies.

"We are pleased to be able to record a great increase in the numbers of Gas Companies that have adopted schemes of co-partnership and profit-sharing, including the Leamington, Rugby, Walker and Wallsend, Wrexham, Tunbridge Wells, and Tottenham Companies. Others are giving the matter careful consideration. We are naturally glad to know that the application of our principles to this industry is increasing, and desire to pay a tribute to the great help the late Sir George Livesey gave in this direction. This extension of our principle is due, to a very great degree, to his untiring efforts."

Particulars of Co-Partnership and Profit Sharing in British Gas Companies.

Name of Company.	No. of Years Scheme has been in Operation.	Capital in 1908. Total Share and Loan.	No. of Employees under Agreement for Profit Sharing or Co-Partnership.	Amount Divided Among Employees for Year Ending June, 1908.	Amount per Cent. on Wages.	Total Profit to Employees since Scheme was Adopted.	Amount of Shares and Deposits held by Employees in the Company. Market Value on June 30, 1908 (about).	May Employees be on the Board of Directors?	No. of Employee Representatives on Board.
		£		£		£	£		
South Metropolitan	Since 1889	8,325,340	5146	36,426	7½	427,279	363,367	Yes	3
Commercial	,, 1901	2,528,280	1201	5,392	5	34,672	38,959	No	None
South Suburban	,, 1894	831,363	541	2,419	5	30,418	30,607	Yes	2
Newport (Mon.)	,, 1900	318,380	180	386	2·15	2,891	3,408	No	None
Chester	,, 1901	181,414	70	303	5	1,619	1,372	No	None
	..	12,184,777	7138	44,926	..	496,879	437,713	..	..

The following Gas Companies have adopted co-partnership and profit-sharing schemes during 1908: Leamington, Rugby, Walker and Wallsend, Wrexham Tunbridge Wells, and Tottenham.

[Bournemouth, Gloucester, and Croydon should now be added to this list.—ED.J.G.L.]

UNIVERSITY OF LEEDS.

Lectures on Gas Manufacture and Distribution and Bye-Products Coking Processes.

We have received from Professor W. A. Bone, D.Sc., F.R.S., the Head of the Department of Fuel and Gas Engineering at the University of Leeds, an advance copy of a circular giving details of special courses of lectures which are being arranged, in connection with the department, on the subjects of gas manufacture and distribution and bye-products coking processes. It is proposed to issue the circular, which is given below, to the proprietors and managers of gas-works within fifty miles of Leeds; and it is hoped that many of the younger engineers in the North will make an effort to attend the lectures, which the authorities of the University trust will become a permanent feature of their work.

THE CIRCULAR.

In connection with the work of the new Department of Fuel and Gas Engineering at the University of Leeds, arrangements are being made for the delivery of the following special courses of lectures, on "The Manufacture and Distribution of Coal Gas," and "Bye-Products Coking Processes," by gentlemen who are acknowledged authorities on their respective branches of fuel technology. The courses will be open to all persons engaged in either of the industries concerned; and it is hoped that many such will avail themselves of the opportunities thus offered of hearing the latest developments on these important subjects expounded by lecturers so eminently qualified by practical experience to deal with them.

(A) The Manufacture and Distribution of Coal Gas.

A course of twenty lectures, divided into two parts, to be given by Dr. Harold G. Colman, of London, and Mr Walter Hole, Superintendent of the Gas Distribution and Mains Department of the Leeds Corporation, on Wednesdays, at 6 p.m., and Thursdays, at 9 a.m., during the second term (ten consecutive weeks), commencing on Wednesday, Jan. 13, 1909, and continuing until Thursday, March 18.

SYNOPSIS.

PART I.—*The Manufacture of Coal Gas.*

[Fourteen lectures by Dr. Harold G. Colman.]

A general description of the plant and processes involved in the manufacture of coal gas and carburetted water gas. Description and valuation of coals suitable for gas making. Analysis of coal. The chemical and physical changes involved in the carbonization of coal. Effects of temperature and other factors on the nature of the products Horizontal, inclined, and vertical retorts. Construction of retort-settings. Methods of maintaining uniform temperatures throughout the retorts, with simultaneous economy in fuel consumption. The initial treatment of volatile products evolved from the retorts. Hydraulic and dry mains. Condensation. Elimination of tar-fog and naphthalene. Exhausters. Wet and dry purification. Cyanide recovery. Other bye-products—*e.g.*, coke, tar, and ammoniacal liquor. Manufacture of ammonium sulphate. Spent oxide, spent lime, &c. Manufacture and carburetting of water gas. The analytical control of gas-manufacturing processes. Discussion of present-day requirements for a public gas supply.

PART II.—*The Distribution of Coal Gas.*

[Six lectures by Mr. Walter Hole.]

General Principles of Distribution.—Character of districts. New areas in relation to existing supply. Distribution of demand. Districting. Alternative systems. Arterial arrangement. Separate districts.

Proportioning of Mains.—Discharges from pipes. Variations for bends, tees, &c. Sloping mains. Projections. Throttling. High-pressure formulæ and discharges.

Pressures.—Governing supply. Station governors. District governors. Various methods of loading. Distance governing. Pressure measurement and records.

The Distribution System.—Pipes, joints, and jointing materials. Effect of expansion and contraction. Services. Subways.

Measurement of Gas.—Station meters. Wet meters. Registration. Drum devices. Compensation devices. Conditions of accurate measurement. Dry meters. Principles involved. Four-phase operations of valves. Attic arrangements. Prepayment meters. Operation of prepayment mechanism. Stops *versus* slots.

High-Pressure Distribution.—Tendency of modern practice. Limitations. Compression engines and pressure-raising apparatus. Effect of compression on gas. Methods of transmission. Boosting. Governing down. High-pressure services.

Parts I. and II. will be given consecutively; and the fee for the whole course will be £1 1s.

It may be pointed out that the arrangements for the course will enable students living at a distance from Leeds to attend *two* lectures by staying *one* night per week in Leeds. Overnight accommodation for a limited number of students can be provided at Lyddon Hall, the Hall of Residence of the University, at an inclusive charge of 6s. for dinner, bed, and breakfast. Early application for this accommodation should be made to the Warden, Lyddon Hall, Leeds. Students are, however, at liberty to make other arrangements; and, if desired, the University authorities will be glad to supply a list of registered lodgings.

(B) Bye-Products Coking Processes.

A course of six lectures by Mr. Ernest Bury, M.Sc., of the Brackley Coke-Works, Little Hulton, near Bolton (Lancs.), on Saturday afternoons at 3 o'clock, commencing Saturday, Jan. 23, 1909.

SYNOPSIS.

Historical introduction. Development of bye-products coking processes considered from a general standpoint. Various types of ovens and their construction. Gas condensing and scrubbing plant. Ammonia recovery and the manufacture of ammonium sulphate. Treatment of waste gases from the sulphate plant. Recovery and refining of benzol. Utilization of coke-oven gas. Selection of coking coals. Preparation of coal for carbonization. Slack-washing. Disintegrators. The scientific control and management of a bye-product coking plant. The future of the process in relation to national economy of coal supplies.

Fee for the course, 10s. 6d.

Practical Demonstrations.—In connection with the above lectures (B), Mr. Bury is willing to arrange to give a series of six laboratory demonstrations of analytical methods specially adapted to the scientific control of a bye-product coking plant, provided that not less than *five* students intimate their intention of attending. These demonstrations will be given on Saturdays from 11.30 a.m. to 1.30 p.m., commencing Jan. 23 The fee will be £1 1s., including the use of apparatus.

Important Notice.

Arrangements for the delivery of the above courses of lectures can only be completed provided the attendance of a certain minimum number of students is guaranteed beforehand. Intending students are therefore requested to send in their names without delay to the Registrar of the University, specifying at the same time the course or courses which they desire to attend. Other inquiries regarding the courses should be addressed to Professor William A. Bone, D.Sc., F.R.S., the Head of the Department of Fuel and Gas Engineering.

PRESENTATION TO MR. S. S. MELLOR.

Progress of Gas at Northwich.

In the month of June last, as recorded in the "JOURNAL" at the time, the employees of the Northwich Gas Company presented the Manager and Secretary (Mr. Samuel S. Mellor) with a testimonial, as a mark of their respect and esteem, and in commemoration of the completion of his twenty-five years' connection with the Company. When he took up his duties in 1883, the annual production of gas was only 18 million cubic feet; whereas last year the make was 76 millions. In the intervening period, the number of consumers increased from 800 to 4000; while the length of pipes is now 25 miles, compared with 10 miles a quarter-of-a-century ago. The financial prosperity of the concern has advanced to a degree which must have afforded the shareholders a considerable amount of pleasure. When Mr. Mellor first took charge of the works, the dividends were at the rate of 7½ per cent. per annum; while during the past four years the maximum—10 per cent.—has been paid. Accompanying the increased dividend has been the reduction of the price of gas, the wages of the employees have been raised, and the works have been enlarged.

The satisfaction of the shareholders at the results of Mr. Mellor's management prompted them to recognize his services in a tangible way; and they lately resolved to present him with an illuminated address and a purse of gold. This was done at a pleasant gathering which took place at the Crown and Anchor Hotel on the 26th ult. The text of the address was as follows:—

> To Samuel S. Mellor, Esq.
>
> Dear Sir,—We, on behalf of the shareholders in the Northwich Gas Company, desire to place on record their high appreciation of the very able manner in which you have discharged the duties of General Manager during the past twenty-five years; and as a recognition by them of your services in that capacity, they beg to ask your acceptance of this address with the accompanying purse of gold. They fully appreciate the way in which you have attained the present satisfactory results of working, and that the praiseworthy efficiency of all branches of the work is to a large extent due to your zeal, energy, and attention. They hope you may have health and strength to continue to promote the interests of the Company for many years to come; and they sincerely trust that this testimonial may often remind you of the high esteem in which you are held in this neighbourhood.
>
> Signed on behalf of the shareholders,
> JAMES SANDARS, Chairman.
> JAMES K. HESKETH, Vice-Chairman.
>
> Northwich, Nov. 26, 1908.

The Chairman (Mr. Sandars), who presided, said the Company was one of the oldest and most successful in the town. At times in its career those in charge of its interests had very anxious moments, notably when the Electric Supply Company was formed. Many people were then of opinion that the days of the Gas Company were numbered; but the experience in Northwich was the same as in all other towns—that with the increased demand for electric lighting there was also an augmented demand for gas, and that there was room for both Companies. He did not think the position of the Gas Company was ever so high as at present; and its success was in a great measure due to the excellent way in which it was managed. Speaking as Chairman of the Directors, he said he did not know any body of shareholders whose interests were watched so closely as theirs. They had an excellent Manager in Mr. Mellor; and whatever decisions were arrived at, he carried out as the Board desired. Unless they had co-operation between Directors and staff, it was impossible for success to be attained. Mr. Mellor had completed his twenty-five years of service; and at the last meeting of the Board they decided to present him with a purse of gold and an address.

The Vice-Chairman said he had been a shareholder in the Company for a number of years, and had very closely watched its interests; and he was pleased to say it was never in so satisfactory a position as it stood to-day. He could not speak too highly of Mr. Mellor's managership. He had studied the well-being and prosperity of the Company as though it had been his own undertaking; and it was felt by the Directors that it was only fitting for themselves and the shareholders to show their appreciation of his services.

Mr. Sandars then asked Mr. Mellor's acceptance of the gifts, and said he hoped he would be spared many years to preside over the working of the Company.

Mr. Mellor expressed his sincere thanks, and assured them that he had worked very hard to further the interests of the Company. He gave figures in proof of the progress made in all directions during his twenty-five years' service, and stated that the revenue was going up each year.

BRITISH COALITE COMPANY, LIMITED.

Directors' Report.

The report of the British Coalite Company, Limited, for the fifteen months ended Sept. 30, which is to be submitted at the meeting to be held at Salisbury House to-morrow, states that the period in question has been occupied in constructional and development work which has received the unremitting attention of the Directors, in conjunction with their technical advisers. As is necessarily the case with the construction of plant, not only of great magnitude, but dealing with an entirely new enterprise, a longer time has been occupied than could have been originally foreseen; but the result has been to effect still further improvements in the manufacture of coalite and its bye-products, both in the way of economies in working and more profitable results in output. The Directors are glad to be able to report that, notwithstanding all the difficulties which have had to be dealt with, excellent progress is being made with the various works. Two units of coalite plant are now in operation at Wednesfield, together with bye-product recovery and power plants; while the first unit of the Company's plant at Barking is also producing coalite. A foundry has been erected at Wednesfield, in order that the Company may manufacture their own plant, by which means great economies are being effected. An installation of coalite plant on a large scale at Plymouth, in connection with the contract with the Plymouth and Stonehouse Gas Company, is well advanced; and the Directors are advised that these works will be brought into operation in January. These, with the necessary coal and coalite stores, constitute a complete gas installation.

Commenting yesterday on the report and the accounts which accompany it, the "Financial Times" said: "The report of the British Coalite Company has no doubt been awaited with very considerable interest, and possibly with some anxiety, by the shareholders; and, seeing the large amount of ordinary capital involved, the matter is of considerable public importance. The report covers a period of fifteen months, to Sept. 30 last; and it is interesting first to glance at the capital account as it stood at the latter date. The authorized capital of the Company consists of £2,000,000, divided into £1,500,000 of £1 ordinary shares, and £500,000 of £1 deferred shares; these last being all taken, or to be taken, by the vendors in satisfaction of the purchase consideration. Of the ordinary capital, £750,000 has been actually issued; but it is not without significance that £29,000 of these shares have been forfeited, and that the calls in arrear amount to nearly £244,000, thus reducing the actual paid-up ordinary capital to £477,000. This can hardly be regarded as a satisfactory showing. With respect to the revenue and expenditure account, it is explained that the period has been one of 'constructional and development work.' The total expenditure for the period amounts to £51,600. Of this, £11,400 represents the cash consideration paid to the vendors for expenses at Wednesfield, and £24,600 the actual expenditure at that place, 'including that in connection with the liabilities of the vendors,' the exact amount of which last is not specified. The balance of disbursements consists of what may be described as mainly administrative expenditure; and this appears on the face of it to have been very heavy. Thus, £2900 has gone to Consulting Engineers and Chemists, £9000 is absorbed by head office expenses, including Directors' fees, wages, and salaries, and £2300 in rent, printing, and other miscellaneous charges. On the revenue side of the account, the main items are £3400 for interest and £3600 for 'sales of coalite and sundry credits.' The net outcome of the operations is a debit balance of £44,600. The Directors say that a longer time has been occupied with the erection of the plant than was anticipated; but they are glad to report excellent progress with the various works. The meeting is to be held on Wednesday at Salisbury House; and we shall be glad to have the Chairman's views as to the future of this undertaking. The start can scarcely be called propitious."

Price and Quality of Salford Gas.—The Eccles Town Council last Wednesday appointed representatives to a conference to be held in Manchester to consider the charges for the supply of gas made by the Salford Corporation, and also to interview the Gas Committee with respect to their proposal to seek powers to reduce the standard of the illuminating power of the gas. It was held by the Council that, if Salford's proposal were agreed to, the consumers of gas in cottages in the out-districts might as well resort to candles again. It was further suggested that an effort should be made to compel Salford, after receiving a certain percentage of profit upon the gas undertaking, to devote the remainder of the profit either to the reduction of the price of gas, or to the division of it *pro rata* among the several out-districts consuming gas.

DEVONPORT AUTOMATIC INSTALLATIONS.

Special Committee's Report on the Contract with Willey and Co.

A report was issued to members of the Devonport Town Council yesterday by the Special Committee appointed last week to investigate and report upon the agreement entered into with Messrs. Willey and Co. for providing and fixing automatic gas installations throughout the borough.

The Town Clerk (Mr. R. J. Fittall) submitted to them all the minutes, correspondence, and papers in his possession relating to the subject under investigation. From these, it appeared that at the time the gas undertaking was acquired by the Corporation an agreement made by the late Gas Company, dated July 26, 1898, was in operation. Under this, Messrs. Willey and Co. were to provide and fix during a period of fifteen years from the date of the agreement certain automatic meters and grillers, and to maintain the meters, grillers, pipes, &c., for the same period. The Gas Company were to pay £4 13s. for each installation, and a proportionate amount when fewer fittings were provided and less work done, and also 4s. 8d. per annum for each installation for maintenance. The charge for maintenance might be determined by giving one month's notice in writing to remove the meter, griller, &c. The Gas Company bound themselves to place all work connected with the providing and fixing of automatic meters, grillers, and fittings in the hands of the contractors exclusively. It was provided that the agreement and the period of fifteen years might be determined at the end of the fifth or tenth year by six months' previous notice in writing. On May 29, 1902, the Gas Committee requested the Works Sub-Committee to report on the agreement with the late Gas Company. They accordingly reported that it would terminate on July 26, 1913, and that it would cost the Corporation less than £4 to do the work for which the contractors charged £4 13s. The Gas Committee resolved that notice be given to terminate the agreement on July 26, 1903; and this was done. Mr. H. A. Willey then made certain proposals with a view to a continuance of the contract; and subsequently the proposals of Messrs. Willey and Co. were submitted in writing and furnished to the Committee. The subject was referred to at several meetings of the Committee. At a meeting of the Works Sub-Committee on April 16, 1903, the Manager (Mr. S. E. Stevenson) was instructed to prepare a draft agreement for a ten years' contract with Messrs. Willey and Co.; and this was referred to the then Town Clerk (Mr. A. B. Pilling). At a meeting of the Gas Committee on July 30, 1903, the Deputy-Town Clerk reported that the agreement had been executed by him. The terms of the agreement did not appear in the minutes of either the Works Sub-Committee or the Gas Committee; and no resolution was recorded accepting the terms, ordering the contract to be entered into, or directing the sealing of the agreement that had been come to.

The correspondence showed that on October 9, 1902, Mr. H. A. Willey wrote to the Gas Committee offering to reduce the contract price of £4 13s. to £4 4s., to provide cooking-stoves instead of grillers at 14s. extra, to make no charge where cooking-stoves had been previously fixed instead of grillers, to make no charge for maintaining the installations in perfect order for five years ensuing, and to charge 5 per cent. per annum upon the capital cost for the remaining five years. In another letter Mr. Willey pointed out that the proposed new terms were 9s. 6d. for every installation less than the original contract; and that the whole of the installations were to be maintained in perfect working order for five years without charge. There were also letters which showed that there was friction between the Engineer and Mr. Willey with reference to the automatic installation work which was then being carried out; and there were further letters which the Committee did not think that it was necessary to make public at the present time.

The draft agreement submitted to the Gas Committee on April 30, 1903, in the handwriting of Mr. Stevenson, contained the following clause: "Provided that this agreement and the period of ten years mentioned in these articles may be determined by, and at, the option of the Corporation at the end of the fifth year thereof by giving to the contractors six calendar months' previous notice in writing." The draft agreement was afterwards revised by the late Town Clerk in red ink; and among other alterations, the above clause was struck out. On the back of the draft there was the note in the handwriting of the late Town Clerk, "Revised on instructions of Sub-Committee July 16, 1903." No minute of this Sub-Committee was anywhere recorded; and there was no record that the agreement was submitted to the Gas Committee for final sanction. The Deputy-Town Clerk stated that, acting on instructions, he produced it to the Mayor for sealing, and it was sealed. The late Town Clerk had since informed the Committee that the Sub-Committee directed that the notice clause should be struck out of the agreement. He was surprised that there was no record of the meeting at which this was done, but this might be accounted for by the fact that he was then about to relinquish the appointment, and the staff was extremely busy straightening things for his successor. The Special Committee invited Mr. Stevenson to meet them; but he declined. He, however, answered a number of questions put to him in writing by the Town Clerk. He said he did not recommend the Gas Committee to accept the terms of Messrs. Willey and Co., but, on the contrary, advised that the work could be done more cheaply by themselves than by contract. He did not advise the Committee to make the contract for fifteen years instead of ten years. Mr. Willey personally attended the meeting of the Works Sub-Committee at which the notice clause was struck out of the draft agreement, and persuaded the Committee to do this.

In accordance with the instructions of the Special Committee, the Gas Engineer (Mr. J. W. Buckley) submitted a report on the subject of the agreement, and gave a table showing the cost of the different kinds of installations provided for in the agreement, and giving in comparison the quotations of another firm in 1903 and in 1908, and also the cost of six installations fixed under his direction as an experiment.

As to the cost of maintenance in the five years that the contract had to run, Mr. Buckley said that in the quarter ending September there were 9111 installations, the maintenance of which, at 1s. 2d. per quarter (4s. 8d. per annum), cost £531 9s. 6d. A fair average of the increase in the number of installations was 240 per quarter; and on this basis the number would be 13,751 on the termination of the contract on July 26, 1913. Calculating the cost of maintenance on the increasing number, he came to the conclusion that in the last quarter it would reach £802 2s. 10d., and that the total sum which the Corporation would pay for maintenance in the five years would be £14,091 12s. 10d. With regard to the cost of maintenance of installations if the Gas Committee did the work themselves, he had no hesitation in saying they would save during the term of contract £7045, placing it at the lowest computation. In fact, he would not be surprised if the actual results proved that an even much greater saving had been effected. Mr. Buckley pointed out that the charge of 4s. 8d. was arrived at on the basis of 5 per cent. of the maximum charge of £4 18s. in Messrs. Willey's schedule, and said that, as a matter of fact, the meters, which formed a large percentage of the cost, were, under normal conditions, maintained by a cooker for five years free of charge. The second largest item in an installation was the cooker; and though only about 40 per cent. of the installations had cookers fixed, the 5 per cent. was apparently charged on the whole number.

—	Prices paid, Willey.	Another Maker's Prices. 1903.	Another Maker's Prices. Per cent. below Willey.	Another Maker's Prices. 1908.	Another Maker's Prices. Per cent. below Willey.	Gas Committee's Prices. —	Gas Committee's Prices. Per cent. below Willey.
	£ s. d	£ s. d.		£ s. d.		£ s. d.	
1. For each installation consisting of three points of light	3 15 0	3 0 6	19	2 15 0	27	2 15 5	26
2. For each installation consisting of three points of light with a boiling ring	3 18 0	3 6 0	15	3 0 0	23	3 2 7	22
3. For each installation consisting of three points of light with a griller . .	4 4 0	3 11 6	15	3 5 0	22	3 5 0	22
4. For each installation consisting of three points of light with a cooker . .	4 18 0	4 3 7	15	3 16 0	22	4 0 9	17

Messrs. Willey and Co. wrote on Oct. 14 suggesting that, in fairness to themselves, an opportunity should be given to members of their Board to meet the Committee and go into the matter with them. The Town Clerk on Nov. 13 invited the firm to attend a meeting of the Committee; but, in reply, Messrs. Willey's Solicitors wrote that they had advised their clients not to do so.

On Nov. 30, Alderman Hornbrook, who had been for several years Chairman of the Gas Committee, but was deposed on Nov. 9 last, was present at a meeting of the Special Committee. Replying to Mr. Tozer, the present Chairman of the Gas Committee, Alderman Hornbrook said he knew nothing about the contract, except that the Engineer told him at the time it would have been a good thing if the Corporation had had another five years added. He did not deny that the draft agreement was sent to him; but he did not suppose he read it. He left it—as he left his own drafts—to the Solicitors. He understood it was an agreement which in the final settlement gave satisfaction to the Town Clerk and Engineer. He did not remember whether it was brought before the Gas Committee as a whole, and was not responsible for any omission of this kind. Mr. Buckley said that when the question of the cost of maintenance was brought under the notice of the Gas Committee on Sept. 21 last, and he was blamed by one of the members for not having called attention to it, he replied that he had mentioned the matter to the Chairman from time to time, and the Chairman had replied that, as the contract was entered into before he (Mr. Buckley) came, it was no part of his duty to lay it before the Committee. Alderman Hornbrook said it was true that the matter had been mentioned to him a fortnight before the question was raised in Committee; but it was not correct to say that he told Mr. Buckley it was no part of his duty to bring the matter forward. What he had said was that, as Messrs. Willey would shortly be coming to Devonport, they could then be seen as to what could be done. Mr. Buckley said he did not agree that the attention of the Chairman of the Committee was called to the matter for the first time only a fortnight before Sept. 21. On Feb. 6 last, he wrote to the Deputy Town Clerk on the subject, being then under the impression that the agreement was determinable by six months' notice. He had the subject down on the *agenda* for the meeting of the Gas Committee on that day, and for meetings in March and July; but Alderman Hornbrook, as Chairman of the Committee, in discussing the *agenda* with him prior to the meetings, had advised the omission of this item. Alderman Hornbrook told the Special Committee that he had no recollection of the matter ever having been put on the *agenda;* and it was not true he said to the Engineer that, if any complaint was made, he would clear him of all responsibility. He did say, "In my opinion I should not bring this immediately before the public or before the Committee. I should treat this as I should treat it if it were my own concern. If we are in a hole, we must get out of it as best we can; and I think we had better wait until we can see these people. Then you and I can hear what their disposition is, and see if we can arrive at an amicable settlement." Mr. Buckley agreed that this was substantially what passed, and emphasized the fact that he had mentioned it to the Chairman of the Committee. In answer to questions by the Committee, Alderman Hornbrook said he, the Deputy-Chairman, and Mr. Buckley went to Exeter, and submitted certain propositions to Messrs. Willey in an informal way. It was the Engineer's duty to report the fact of that visit to the Gas Committee. It was not true that he had given Mr. Buckley strict orders not to put anything about the visit on the minutes. Mr. Ellis (a member of the Committee) said the Engineer stated at the last meeting that it was as much as his place was worth to go against the Chairman. Alderman Hornbrook replied that

he hoped the Engineer did not make such a statement. They had worked together amicably for 3½ years; and it was only six or seven weeks ago that a difference of opinion arose. Mr. Ellis retorted that unless he did exactly as the Chairman wished, it would have had the same result as it did with his predecessor—he would have been ousted out of the town. Alderman Hornbrook said it was not true. He and Mr. Buckley had been more like brothers than like Engineer and Chairman. Mr. Buckley remarked that what he had said at the previous meeting was that he thought a paid official had done his duty when the Chairman of his Committee took the responsibility upon his own shoulders, as Alderman Hornbrook did in this matter. It was no part of his duty to quarrel with his Chairman on the matter. Had he done so, he would have either experienced the most unpleasant period a man could experience, or he would have suffered the fate of his predecessor. He said this under pressure; but it was what had happened in Devonport and in other municipalities. Mr. Buckley went on to say that on the very day this matter was raised in the Gas Committee, Alderman Hornbrook had shown how dangerous it was for a man to go in opposition to his Chairman, by writing him in curt tones with reference to an order which had been given for pipes. Alderman Hornbrook, in explaining this, said that he had heard that the Engineer had said something very bad; and he had had a bad feeling for the moment. But this was gone; and the Engineer and he would part on good terms. Mr. Buckley had served them well, and been a good Engineer. Mr. Buckley said there was no one more sorry than he was about this agreement. It was entered into before he came, and it was a matter of regret that his predecessor should have left under similar unpleasant circumstances.

In concluding their report, the Special Committee said that they had given instructions to the Gas Engineer to hold over for the present new applications for automatic installations. They recommended the Town Council to give them further powers to enter into negotiations with Messrs. Willey and Co.

MALVERN GAS SUPPLY.

At the Meeting of the Malvern District Council last Tuesday, the annual report of the Engineer and Manager (Mr. W. J. Rendall Baker) was presented. It was stated therein that, though the coal had cost £1100 more than in 1907, the profit per 1000 cubic feet of gas sold was only 5d. less. The net surplus showed only about £200 less; while new work to the extent of more than £900 had been carried out—this being all charged to repairs account. The leakage was less than half what it was a few years ago; being now about 7½ per cent. All the new work, such as meters and cookers, together with the whole of the wages expended in dealing with them, had been paid for out of revenue. The capital was being repaid at the rate of £4700 per annum. The charges on all hands showed a decided reduction. The quantity of coal now carbonized was approximately 10 per cent. less than in previous years. The gas used for Council purposes was charged at 2s. 10d., instead of 3s. 4d., per 1000 cubic feet, and for public lighting 2s. 10d., instead of 3s. Of the total sales, 14 per cent. was made through prepayment meters. The capital employed was £85,246; and the net surplus was put at £2281.

Messrs. Allen, Edwards, and Co., of Birmingham, who had made a commercial audit of the gas accounts, with a view to ascertaining what the net profits should be, so as to see whether the Council's present system was the right one for arriving at the profit actually received from the undertaking in relief of the general rating fund, reported that the accounts were made out in accordance with the Local Government Board's requirements; but they did not show correctly the profit made during the one year. They calculated the real cost of manufacturing and distributing gas to be 2s. 11d. per 1000 cubic feet sold; but they said that if the amount for meter and stove rents and profit on fittings were deducted, the amount would be 2s. 10·54d. They recommended that the gas accounts should be kept entirely separate; and they set down the net surplus at £2548.

The Chairman of the Gas Committee (Mr. Moerschell) thought that the audit presented a very satisfactory result. Were it not for the Council's huge capital expenditure, the gas undertaking would, he said, be much more profitable. According to the consumption of gas, it really meant that a part of their capital was lying idle and unproductive. Errors were made in former years. They gave £35,000 for the Link Gas-Works, which were only worth £10,000. There were only three undertakings in the kingdom which were working upon a higher capital than the Malvern Council were doing. The Engineer had emphasized the point that they were paying for repairs, &c., out of revenue, and not by loans; and they had every reason to be satisfied with the way in which the works were being carried on. Mr. Sparkes observed that the Local Government Board would probably require some change in the manner in which accounts were to be kept, and he did not think it would be well for the Council to make any change at present, as suggested by the Auditors. The reports were adopted.

The New Water Supply for Oldham.—In moving the adoption of the minutes of the Water Committee at the meeting of the Oldham Town Council last Wednesday, Alderman Johnson called attention to the report of Dr. Thresh on samples of water from the Butterworth Hall Collieries, which it was proposed should be utilized for the supply of the borough. It confirmed, he said, what he had stated before from the time negotiations commenced in 1886—namely, that the water was of excellent quality. The reports of the Analyst had been very satisfactory, and disposed once for all of the impression that the water was not entirely fit for human consumption. Mr. Johnson read the report of Dr. Thresh, and also read one made by Dr. Percy F. Frankland, F.R.S., Professor of Chemistry in the University of Birmingham, which had been read at that day's meeting of the Water Committee. In his (Alderman Johnson's) opinion, these reports showed that the water they were seeking to obtain was the right sort, and would prove a very useful addition to the supply of the borough.

PRICE OF GAS AT ROCHDALE.

The commercial community of Rochdale have been further addressing themselves to the question of the price of gas. Last week we reported a discussion by the Merchants and Tradesmen's Association; and now there fall to be recorded some remarks which were made at the recent annual meeting of the Shopkeepers' Union.

Mr. Hardman explained that at the last meeting of the Committee he was instructed to write to the Chairman of the Rochdale Electricity Committee in regard to the charges for current, and to obtain a list of the gas charges in various towns. He had written to the Chairman of the Electricity Committee, but had not as yet received a reply. As a result of inquiries made, he had ascertained that the price of gas in Oldham, Bolton, Bury, and Manchester was considerably less than it was in Rochdale. At Oldham, the price was 2s. 2d. per 1000 cubic feet for lighting and power purposes; at Bolton, 2s. 4d. for both lighting and power; at Bury, 1s. 11d. for lighting, and 1s. 5d. to 1s. 9d. for power; and at Manchester, 2s. 3d. for lighting, and 1s. 9d. for power. In Rochdale, the price of gas was 2s. 6d. for lighting, and 1s. 6d. to 2s. for heating and power purposes. He did not know whether discount was allowed on the gas charges made in the towns to which he had referred.

Councillor Diggle remarked that the price of gas in Rochdale was reduced in proportion to the amount consumed. The average price was 2s. 2d. per 1000 cubic feet. There was a unanimity of opinion in the Council that the rates of the borough should not be increased. It was most important that the rates should be kept down, even if it were done by taking a little of the profit made at the gas-works. Did they think that the new mills would have been erected in the borough if the rates had been 8s. or 8s. 2d. in the pound? The Corporation estimated that the gas-works were worth £260,000. Last year they made a profit of about £11,000, which was less than 4 per cent. on the outlay. Was that a big profit? If they reduced the price of gas by 1d. per 1000 cubic feet, 1d. would have to be put on the rates. A list which had been prepared by the Borough Treasurer of Preston (*ante*, p. 646) showed that of 91 towns the charge for gas was higher in 67 than it was in Rochdale; and included in this list were Lancashire and Yorkshire towns. For a modern mill erected in Rochdale a sum had to be paid in rates equal to ½d. in the pound. If they had not so many mills, the rates would have to go up. On looking at the "Municipal Year Book," he found that the average price charged for gas by 211 local authorities in England and Wales was 2s. 4½d. per 1000 cubic feet; while the average price of gas sold by 467 private companies was 2s. 8½d. In Rochdale, the maximum price was 2s. 6d., and a reduction was made for gas used for cooking and power purposes. Until recently the price of gas in Manchester was 2s. 4d. per 1000 cubic feet; and when he was paying that price in Manchester, the rates were 8s. 4d. in the pound. So far this year there had been a decrease in the consumption of gas in Rochdale of about 8 million cubic feet. They were therefore not likely to be able to take £10,000 from the profits at the end of the year for the relief of the rates.

ELECTRICITY SUPPLY IN LONDON.

The London County Council and the Electric Supply Bill.

At the Meeting of the London County Council last Tuesday, the Parliamentary Committee presented a long report on the proceedings of the Select Committee of the House of Commons on the London Electric Supply Bill (1908), the object of which is to confer powers upon nine of the Electricity Supply Companies in London to connect their undertakings.

The Select Committee, when dealing with the Bill, had before them the following instructions from the House of Commons: "(1) That it be an instruction to the Committee to which the Bill is referred that they have power to insert a provision constituting the London County Council the purchasing authority on equitable terms. (2) That it be an instruction to the Committee that they have power to insert such provisions in the Bill as will ensure that the powers proposed by the Bill to be conferred upon the London Electric Supply Companies shall be conferred also on the Local Authorities who are authorized distributors in the Administrative County of London." The Committee of the Council severely criticized the way in which the Select Committee had dealt with the instruction with regard to the purchase by the Council of the various electricity undertakings. They pointed out that the Committee adopted, in face of the Council's strong objection, the proposal of the Companies to require the Council to finance them during the years immediately before purchase. An obligation of this kind was, so far as they were aware, entirely unprecedented. There would be no reasonable objection to an enabling power of this nature being given to the Council to advance money on agreed terms; but the clause put forward by the promoters made it incumbent on the Council to lend money to meet the demands of the Companies for any expenditure the Board of Trade might decide to be reasonable. A proposal such as this, which compelled a local authority to lend an indefinite amount of money without full and adequate security for the payment of interest and principal, was a very serious one, and should be opposed.

Having reviewed the decisions of the Select Committee on other matters, the Committee said: "We had hoped that the proceedings before the Committee would have resulted in the passing of a Bill dealing in a satisfactory way, not only with the question of linking-up, but also with the difficulties of the question of purchase, which have so long been foreseen. As the Bill now stands, there will be little, if any, difference of opinion that, in the interests of the public, the present position of purchase, unsatisfactory though it may be, is preferable to the extraordinary departure contemplated in the Bill from the recognized principles governing the matter. We think, however, that it would be a matter for regret if the present opportunity of removing some of the difficulties in connection with the supply of electricity in London by the Bill is

to be entirely lost; and we think that the Council should endeavour to obtain therein such amendments as may make it compatible with the public interest. There are some further provisions inserted in the Bill, as amended, to which the Council might take objection, but might be prepared to waive so as to arrive at a settlement of this vexed question. We desire, however, to point out that every endeavour should be made during the progress of the Bill to secure the following amendments: (1) That the undertakings of the Companies shall be purchasable under the provisions of section 2 of the Electric Lighting Act, 1888, except in the case of the undertaking of the Charing Cross Company within the area of the City of London. (2) That in the case of this last-mentioned undertaking it shall be purchasable on Electric Lighting Act terms *plus* a consideration in respect of the loss which the Company may sustain by reason of purchase taking place in 1931 instead of 1941. (3) That an enabling power for the Council to advance capital to the Companies after notice of purchase has been given shall be substituted for the obligatory power now in the Bill. (4) That the Council should be entitled to discharge three-fourths and not merely one-half of the purchase-money by the issue of stock. (5) That the Council and the Local Authorities may be empowered to agree as to the purchase by such authorities from the Council of so much of the distributing systems of the undertakings purchased by the Council as may be within their districts. (6) That the usual powers of the Council with regard to street works be inserted in the Bill."

The Committee recommended that they should be authorized to take all steps necessary to secure that these amendments on behalf of the Council should be inserted in the Bill, and to prevent it from passing in its present form; and the recommendation was adopted.

FOG AND GAS CONSUMPTION.

Dark Days Last Week.

The early days of last week witnessed some large increases in the output of gas, owing to the prevalence of fog.

In Manchester, a record consumption in one day was attained on Dec. 12, 1905, when it reached a total of 28,810,000 cubic feet. A near approach to these figures was made last Wednesday, when 27,516,000 cubic feet of gas were consumed, as compared with 24,756,000 feet on the same date of last year. The consumption for three days last week was as follows: Monday, 24,335,000 feet; Tuesday, 25,583,000 feet; Wednesday, 27,516,000 feet. For the corresponding days last year the figures were: 23,870,000 feet; 23,953,000 feet; 24,756,000 feet. All the gas plant can do is to make 25,000,000 cubic feet a day. Up to, and including, Thursday of the previous week, there was a decrease on the year's consumption equal to 2·97 per cent., as compared with an increase of 3·91 per cent. for the corresponding period of 1907—that is, from March 31. It is stated that bad trade shows itself in some of the Gas Committee's returns, as well as mild weather. The consumption has fallen between 8 and 9 o'clock in the evening and between 6 and 7 in the morning—a fact which points, in the judgment of the gas officials, to economy in the houses, early going to bed, and late rising because there is no work to go to.

At Salford there was a busy time; but Mr. W. W. Woodward, the Engineer, said they were quite able to cope with the demand. The amount of gas consumed on Monday of last week was 7,300,000 cubic feet, as compared with 7,200,000 feet on the corresponding day last year. The figures on Tuesday were 7,500,000 feet, against 7,400,000 feet; while on Wednesday the high-water mark was reached—8,200,000 cubic feet being consumed, as compared with 7,300,000 feet on Dec. 2 of last year.

The foggy weather last week in Leeds had a considerable effect on the output of gas. On Tuesday, the consumption was 16,300,000 cubic feet, as compared with 12,700,000 cubic feet on the same day of the preceding week, or an increase of 28 per cent. On Wednesday, Mr. R. H. Townsley, the Engineer and General Manager, started 114 additional retorts at the various works, in order to cope with the severe strain that was being put upon the department.

METROPOLITAN WATER BOARD.

At the Meeting of the Board last Friday, the Finance Committee stated that they had had before them a report by the Accountant, showing in detail the result of the collection of the water-rate for the half year ended the 30th of September. The period covered the first half-year's working of the new Charges Act; and the report showed that whereas the arrears of domestic water rentals outstanding in 1904 at the "appointed days" amounted to no less than £383,621, they had been reduced year by year, and at the 31st of March last, when the old charges ceased to operate, the arrears were only £18,864—a result which, in the Committee's judgment, was attributable to the reorganization and rearrangement of the staff which had been effected in the collecting and revenue sections of the Accountant's department. The arrears in respect of the domestic water-rate had increased to £106,298 at the 30th of September; but the Committee pointed out that the difficulties encountered in bringing the new Act into operation, and the fact that many of the charges were not yet finally settled, rendered a large increase of arrears inevitable.

A long discussion took place on a recommendation of the Works and Stores Committee requiring the Board's approval of an estimate of £18,000 and authority given to the Committee to incur further expenditure, not exceeding £25,426, in respect of the Honor Oak reservoirs. The Committee reported that they were informed by the Deputy Chief Engineer (Mr. J. W. Restler) that the total cost of the completed work would exceed the original estimate by £18,000; and it therefore became necessary to obtain the Board's sanction to expend the balance of the original estimate—viz., £7426—and their approval of a supplemental estimate of £18,000, making £25,426 in the whole. The Committee also pointed out that the Board's Act of 1906 authorized a total expenditure of £180,000, and at the same time sanctioned the borrowing of it. The present estimated cost of £178,000 was therefore £2000 less than the sum sanctioned by Parliament. The Chairman of the Works and Stores Committee (Mr. C. E. Hearson) explained that the site of the reservoir was chosen before the Board acquired the water undertakings; and, to all appearances, the clay there was of the same character as that of other sites. But when they proceeded deeper into the clay, it was found that it would have to be very considerably strengthened to make a good foundation for the reservoir. The extra cost arose through strengthening the reservoirs and in increasing their capacity. It was decided to sanction the expenditure of £7000 odd, as the Chairman of the Committee said the money was needed. The remainder of the amount stands over until fuller details can be furnished in reference to the matter.

The *agenda* for the meeting contained information, in the usual tabulated form, relating to the supply of water in the month of October. The following particulars were furnished: Average daily supply, 227,916,000 gallons; number of houses served, 1,084,610; estimated population, 7,025,182; mean supply per head per day, 32·4 gallons; water in store in impounding reservoirs, 7396 million gallons; additional supplies laid on, 1139; length of mains laid, 12,554 yards.

NATIONAL REGISTRATION OF PLUMBERS.

Formation of a National General Council.

We are asked by Mr. Percy Griffith, the Secretary of the newly-formed General Council for the National Registration of Plumbers, to publish the following particulars in regard to the objects aimed at by the Council.

The movement for rendering the registration of plumbers universal throughout the United Kingdom is one which concerns a far larger circle than that represented by the trade itself. Upon the quality of plumbers' work depends the health of the community at large to an extent scarcely appreciated by the public. Defects in the arrangement and execution of water and sanitary fittings have been responsible for an enormous amount of disease, and even loss of life, owing to the fact that each individual case may become the starting-point for an epidemic, the limits of which cannot possibly be foreseen, and which may produce untold suffering and loss of life before it can be effectually checked.

The matter, although of universal interest and importance, is one in which the public are totally incapable of taking definite action, except under the initiative of those whose profession or trade is, directly or indirectly, connected with questions of sanitation, including both drainage and water supply; but, on the other hand, it is one which cannot be effectually dealt with except in the public interest rather than that of the plumbing trade. Briefly put, the whole question resolves itself into the standardization of both materials and workmanship on such lines that inefficiency can be readily detected and avoided, and high-class work easily recognized and universally secured.

The Worshipful Company of Plumbers have for many years past made use of their financial resources and ancient constitution in fostering and developing the movement having for its objects the national registration of plumbers. The system combines a standard of examination and practical tests, with registration based upon the results of the examinations. This system is protected from abuse on the one hand by the power of the Company to cancel or suspend the registration certificates of plumbers convicted of doing bad work; and, on the other hand, by the Company taking action at law against persons falsely describing themselves as registered plumbers. The system has already effected a great improvement in the average quality of plumbing work throughout the United Kingdom.

It has for several years past been the endeavour of the Company to secure legislation which would recognize the registration of all plumbers who undertake sanitary work or water services. Many difficulties have, however, arisen to prevent the accomplishment of this ideal; and it has gradually been brought home to those concerned in the movement that in order to secure success it is necessary to effect a combination of all interests involved, and more particularly to include in the governing body representatives of the public interests as well as those engaged in the trade.

With this object in view, a new departure has been recently initiated by the formation of a General Council for the National Registration of Plumbers, to whom the Plumbers' Company have now handed over the management of the movement. The Council consists of representatives of local Councils existing and to be formed in numerous centres throughout the country, of delegates from the recognized Associations of Master and Operative Plumbers, together with nominees of the Plumbers' Company, of the Royal Institute of British Architects, the Incorporated Society of Medical Officers of Health, the Association of Water Engineers, the Incorporated Association of Municipal and County Engineers, and the Association of Technical Institutions. The Council will meet annually in various centres under the chairmanship of some local gentleman whose independence and suitability will be acknowledged by all parties.

At a meeting held at Edinburgh, on the 8th of August last, under the presidency of Dr. Robert Crawford, LL.D., late Chairman of the Health Committee of Glasgow, rules governing the new scheme were approved, and the General Council appointed as their Secretary Mr. Percy Griffith, M.Inst.C.E., of Westminster, who is a Consulting Water Engineer and the Secretary of the Association of Water Engineers. For executive purposes, a Managing Committee, composed of representatives of the trade and the public interests in equal numbers, has been formed from the members of the General Council, with Mr. Easton Devonshire, Assoc.M.Inst.C.E., as its first Chairman. This Committee will meet from time to time in London to supervise and harmonize the detailed work carried out by local Councils in connection with the examination and registration of plumbers, and the supervision of plumbers' work throughout the country.

To ensure public recognition and support of the registration move-

ment, it is imperative that the certificate entitling a plumber to place the letters "R.P." (Registered Plumber) after his name should be granted only by an authoritative body capable of exercising *quasi*-judicial powers of decision as to the qualifications of the candidate. The constitution of the Worshipful Company of Plumbers, extending back for a period of five centuries, and especially the organization created and built up by them during the past twenty-two years, including the system of examination and registration, provide the desired authority; and it is an essential condition of the new arrangements as to management that the Plumbers' Company shall continue to be the certifying body, and maintain and protect the register.

The immediate object of the General Council is to demonstrate to the public, as well as to the various parties more intimately associated with the execution of sanitary work, that the movement has for its basis the promotion of public health, and not the protection of a trade as such. On this basis the General Council claim with the utmost confidence the support and assistance of all householders, architects, builders, water and sanitary engineers, and all master and operative plumbers not at present registered. This can be most effectually rendered by the selection of plumbers entitled to the designation "R.P." in preference to those unregistered, by all having the control of plumbing work, and similarly by application for registration on the part of all plumbers not now enrolled on the books of the Worshipful Company.

The following clause of a resolution passed by the Executive Council of the United Operative Plumbers' Association, at a special meeting held in Manchester in July, 1905, indicates the sentiment of the trade in regard to the registration movement: "The local health and water authorities and architect should co-operate, as far as possible, with the local plumbers in furthering the work of the District Councils for the National Registration of Plumbers, especially in setting-up and maintaining a sound standard of work executed by plumbers."

Information on all matters of detail, as well as on more general points, can be obtained on application to the Secretary of the General Council for the National Registration of Plumbers, No. 54, Parliament Street, Westminster, S.W.

REGULATION OF WATER-FITTINGS.

In the last number of the "JOURNAL," it was announced that an "unlimited" Company had been formed to undertake the examination and regulation of water-fittings. The following are the objects of the organization, as set forth in the Articles of Association.

To institute and conduct the examination of taps, cocks, valves, fittings, appliances, and materials employed in connection with the supply and distribution of water for domestic, trade, and other purposes, in respect of their origin, mode of manufacture, quality, strength, accuracy, or other characteristic, and to certify the result of such examination by mark used upon, or in connection with, such articles: Provided that no such mark shall be used unless registered as the property of the Association by the Board of Trade, under the provisions of section 62 of the Trade Marks Act, 1905, or any amending Act; and that its use shall be certified in conformity with regulations approved by the Board as applicable to standardization marks permitted to be registered under that Act for purposes of public advantage.

To prepare and publish from time to time the specification or description of the quality, dimensions, weight, and other particulars of the articles intended to be standardized and marked as aforesaid, and for this purpose to adopt, so far as may be deemed applicable and desirable, the specifications framed by the unincorporated Association known as the Joint Committee on Water Regulations.

To take over and, so far as may be deemed desirable, publish, utilize, supplement, and extend, the records, reports, and other literary matter collected and collated by the unincorporated Association, and to collect, collate, and publish additional particulars of and concerning the powers, practice, and procedure of water authorities, boards, and companies, for the information and use of members of the Association and others engaged in the administration of water undertakings, with a view to securing greater uniformity, convenience, and economy therein, and to promote and aid the enforcement of legislative and other measures for the prevention of waste, misuse, and contamination of water.

To prepare and publish from time to time model codes of bye-laws and regulations and reports in connection with the objects aforesaid, for the guidance of water authorities, architects, authorized officers, manufacturers of water-fittings, plumbers, and others concerned in the specification, control, supervision, and execution of work connected with the distribution and uses of water, &c.

The only persons qualified to be members of the Association shall be: (*a*) The signatories to the Memorandum of Association and persons for the time being nominated by such of the following bodies as shall consent to nominate representatives, to a number not exceeding two by each of the water authorities, boards, or companies in the following towns: Aberdeen, Belfast, Birkenhead, Birmingham, Bradford, Brighton, Bury and district, Cardiff, Cork, Croydon, Dublin, Glasgow, Hull, Leeds, London (Metropolitan Water Board), Newcastle and Gateshead, Norwich, Nottingham, Plymouth, Preston, Sheffield, Southampton, South Hants, South Staffordshire, Stockport, Sunderland and South Shields, Tees Valley, Weardale and Consett, and Wolverhampton; two also by each other water authority representing a population of 100,000 or upwards who may consent to make such nomination; two by the Association of Water Engineers; two by the Worshipful Company of Plumbers; and two by the Royal Institute of British Architects; (*b*) eight persons elected by the Association; and (*c*) not more than two persons nominated by each additional body approved by the Board of Trade—the total number of nominees under this clause not to exceed eight.

The Mazarron Water Supply and Development Syndicate, Limited, has been formed with a capital of £25,000, in £1 shares, for the purpose set forth in the title, and to adopt an agreement with Mr. S. W. Richard.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The post of Manager's Assistant in the Glasgow Corporation Gas Department, vacant by the appointment, in October, 1907, of Mr. James Lowe, to be Gas Manager at Auckland, New Zealand, has been filled up this week. The Gas Committee unanimously recommended the appointment of Mr. Walter Grafton, of the Gaslight and Coke Company, of London, at a salary of £350 per annum. The appointment was agreed to by the Corporation on Thursday. In the Council, Mr. Cohen asked the Convener of the Gas Committee to give further information than was contained in the minutes with regard to the recommendation to appoint Mr. Grafton. There seemed to have been favouritism shown. Had not the Corporation in their service men capable of filling the vacancy? Bailie M. W. Montgomery, the Convener, said that the Committee had not been in a hurry in filling up the vacancy, which occurred fourteen months ago. If they had had a man in their own employment whom they could have recommended for the post, it would not have been vacant so long. It was a more desirable method, when possible, to fill up a vacancy from their own employees; but this could not be done if it were to be to the disadvantage of the Department. Mr. Wilson had considered the matter very carefully, and had asked the permission of the Committee to bring the gentleman whom they now recommended before them. The Sub-Committee were thoroughly satisfied with his capabilities, as were also the parent Committee. Dr. Jamieson moved that the minute be sent back for further consideration. The amendment received only six votes; and the recommendation was accordingly carried by a large majority.

The Western District of the Scottish Junior Association had a brilliant meeting to-night. The paper by Mr. J. M'Ghee, of Glasgow, whose office is in the Workshop Department of the gas undertaking, was a document replete with all the latest information regarding the uses of, and the appliances for using, gas for heating and lighting. The highly practical nature of the communication is reflected in the discussion upon it—the subject touching so many of the members in their every-day work; and much valuable and useful information was elicited, which is one of the principal objects of Associations, particularly of the Junior Associations. That Mr. M'Ghee chose a subject which is of wide interest to all students of gas-supply problems, and handled it in a masterly manner, is indisputable.

Mr. J. Bell, of Airdrie, is to be congratulated upon his selection for the managership at Kirkintilloch. The appointment was made on Thursday. Mr. Bell was one of three selected from the short leet of nine to which the applicants were reduced. The nine were interviewed by the Gas Committee on the Friday before; and the three names were sent forward to the Council. Mr. Bell's appointment is another feather in the cap of the Junior Association. He was President of that Association for a year; and when he goes to Kirkintilloch, it is to succeed one who was himself an ex-President of the Association.

On the afternoon of Saturday last, a new gasholder, which has been erected on the Gadd and Mason spiral-guided principle, was inaugurated in the Helensburgh Corporation Gas-Works. This is the second holder which has been erected by the Corporation since they acquired the gas undertaking. The work was entrusted to Messrs. R. Dempster and Sons, Limited, of Elland; and the time occupied by them in taking out an old and erecting the new tank and holder has been about eight weeks. The tank is 79 feet in diameter by 20 feet deep. There are three lifts, each 20 feet in depth. The estimated cost was £1500, with £100 for contingencies; and it is a satisfaction to know that these sums will not be exceeded. With the two holders there is now a storage capacity of 390,000 cubic feet, which, it is expected, will enable the Manager to give an abundant supply of gas, at an adequate pressure, to all consumers. At the inauguration ceremony, Provost Maclachlan turned on the gas from the new holder to the other; and as the new holder began to fall, Mr. Blair, the Manager, explained its working. The company who had been invited to attend the ceremony, including a number of ladies, were shown over the gas-works; Mr. Blair lucidly explaining the working of the different parts of the plant. They were afterwards entertained at tea in the Council Chamber by Provost and Mrs. Maclachlan, at which function Provost Maclachlan and ex-Provost Bryden spoke appreciatively of the work of the gas undertaking.

On Wednesday, the Committee of the Glasgow Town Council in charge of the Corporation Provisional Order, 1909, received a deputation from the Glasgow Houseowners' Association, who brought before them, among other subjects, the proposal to increase the cost of stair lights from 10s. to 20s., and to reduce the owners' commission from 20 to 10 per cent. This point was discussed at some length. It was specially urged on the Committee that the commission should be retained at 20 per cent., as the owner was liable not only for the collection, but for the payment, of the lighting charge, whether there were tenants in a tenement or not. Mr. J. MacFarlane, who occupied the chair, stated that the point would receive careful consideration.

The Edinburgh and Leith Gas Commissioners held a monthly meeting on Monday—Judge Douglas in the chair. The report of the Engineer for the month of October showed a decreased output of gas, as compared with October of last year, of 8,859,000 cubic feet, and a decreased output since May 16 of 33,148,000 cubic feet. It was reported that an inquiry was received on Aug. 16 last as to the terms upon which the Commissioners would dispose of the Leith Gas-Works, and that the Sub-Committee in charge of the sale of the works having asked £16,000, the proposal was declined. The Finance and Law Committee reported that intimation had been received from the Parliamentary Agents of the Commission that the Scottish Office had promised to take up consideration of the Commissioners' modified Provisional Order in a few days. A deputation from the Commission has been in London this week upon the business. In consequence of a letter received from the Vigilance Society, complaining of further smells from the Granton Gas-Works, the Works Committee had instructed the Engineer to consider the whole subject, and to report fully to them at their next meeting. The Committee's report was adopted. Bailie Bryson, of Leith, was reappointed Convener of the

Works Committee, and Bailie Inches, of Edinburgh, Convener of the Finance and Law Committee; all the members of the Commission being members of both Committees.

Lord Sherrington, in the Court of Session last Saturday, decided, in a litigation between the Caledonian Railway Company and the Glenboig Union Fire-Clay Company, Limited, that fire-clay is a mineral. The object of the Railway Company was to prevent the respondents from working out the fire-clay from below the railway. The respondents maintained that the material was a mineral, and that under their lease they had a right to work it. This contention has been upheld.

Another litigation of some interest was decided in the Second Division of the Court of Session last week, in which the Fife Coal Company, Limited, were sued for £750 at Common Law, or £282 under the Employers' Liability Act, as damages for the death of an on-cost workman through the inhaling of carbon monoxide. There were two pits adjoining, belonging to the Company. In one of them, part of the seam has been on fire for years. The burning area had been built in; but it is believed, on account of an explosion within the enclosure, some of the stopping material had been displaced, allowing the gas to escape. At all events, the workmen felt that there was something wrong with the air in the workings, and in April, 1906, two men were sent to do repairs in one of the roads. They did not return; and when they were searched for, both were found to be dead. The widow of one of them raised this action. The Company offered the sum which was claimable under the Act; but the case at Common Law was pressed. In deciding it, the Lord Justice-Clerk—Sir John Macdonald—said that carbon monoxide was a substance of which but little was known until quite recently. The advance of science had brought it into the region of things known; but it was still so little known that few had had experience with it. He therefore thought there was no case against the Company at Common Law. But he could not hold that the responsible persons in charge of the pit did their duty in the inspection of the mine and the removal of the men out of danger. He therefore found the Company liable under the Act. Decree was given for the sum tendered. The decision was rendered a hollow one by the fact that the Company, having tendered the amount for which they had been found liable, were awarded expenses against the pursuer, which were naturally heavy on account of the amount of scientific evidence led on both sides.

Early on the morning of Monday last, an explosion of gas occurred in a bakehouse underneath a shop in South Bridge, Edinburgh. A workman about to begin his day's duties opened the door of the oven with a lighted taper in his hand. There had been an accumulation of gas in the oven, and it exploded with great force. The man was hurled to the other side of the bakehouse, a distance of about 10 feet, and was rather severely hurt, besides being very extensively burned; the latter injuries being largely due to the scanty clothing he was wearing. The large plate-glass window in the shop overhead was blown out, fragments of it being thrown more than half-way across the wide street. Fortunately, the hour being early, there was no one passing the place at the time.

Sheriff-Substitute Scott Moncrieff has this week issued his judgment in an action brought before him at the instance of the Wishaw Town Council against the Upper Ward District Committee of the Lanarkshire County Council, with reference to the charge for water supplied to the defenders. The Town Council claimed 6d. per 1000 gallons, with a minimum charge of £2 2s. per supply. The rate was raised from 4½d. per 1000 gallons in 1906. The County Council refused to pay the increased charge. Decision has been given in favour of the Town Council. It was a fact, the Sheriff-Substitute said, that the town of Wishaw, in return for obtaining its water supply from, and right to carry its pipes through, the Upper Ward, had agreed to give the defenders a supply of water to be afterwards fixed. The burgh could not have brought water to Wishaw without laying pipes through the county for many miles. But did the county obtain no advantage? The district was a large one, with places which were increasing in population, and sooner or later the District Committee would have had to face the question of water supplies. But then came Wishaw at great expense, and secured from the Upper Ward hills a supply of water, and carried it in such a direction as to be convenient for Crawford, Thankerton, Braidwood, and the growing town of Carluke. It undertook to give so many thousand gallons per day for Upper Ward purposes; and it must therefore, he thought, be held that the county had gained an advantage, and by no means an inconsiderable one. In all the circumstances, and in consideration of the evidence led, he did not think that a rate of 6d. per 1000 gallons was unreasonable.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia.

LIVERPOOL, *Dec.* 5.

Supplies have been fairly abundant, but there has been more buying going on, and values have been about maintained. In view of holidays ahead, buyers have in fact been covering the month's contracts at an earlier date than usual; but there has also been direct buying from abroad. The closing prices are £10 18s. 9d. per ton f.o.b. Hull, £11 per ton f.o.b. Liverpool, and £11 2s. 6d. per ton f.o.b. Leith. In the forward position, the large makers are out of touch with the trend of the market, having sold in advance rather heavily for delivery over the spring months, and not being anxious to make further sales. Smaller makes have, however, been placed at a premium of about 5s. per ton on spot prices. At the close, speculative offering abroad is reported at the level of spot prices.

Nitrate of Soda.

This article is quiet on spot at 9s. 7½d. per cwt. for 95 per cent., and 9s. 10½d. for refined quality, less 2½ per cent. discount.

Tar Products.

LONDON, *Dec.* 7.

Markets for tar products continue quiet, and business is very difficult to negotiate. Pitch has been quiet throughout the week, and

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 679.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 15	10	Alliance & Dublin 10 p.c.	18—18½	+½	5 8 1
268,324	10	,,	7	Do. 7 p.c.	12¾—13¼	..	5 5 8
310,000	Stk.	July 15	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
200,000	5	Oct. 29	6½	Bombay, Ltd.	5⅝—5⅞	..	5 10 8
40,000	5	,,	6½	Do. New, £4 paid	3⅜—4⅜	..	6 6 1
50,000	10	Aug. 27	14	Bourne-mouth Gas and Water	10 p.c.	..	4 13 4
					B 7 p.c.		
					Pref. 6 p.c.		
51,810	10	,,	7		16¼—17	..	4 2 4
53,200	10	,,	6		15¼—16¼	..	3 13 10
380,000	Stk.	Aug. 13	12½	Brentford Consolidated	245—248	..	5 0 10
300,000	,,	,,	9½	Do. New	187—190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	..	4 0 8
206,250	,,	June 12	4	Do. 4 p.c. Deb.	102—104	..	3 16 11
220,000	Stk.	Sep. 11	10½	Brighton & Hove Orig.	208—211	+1	5 1 10
246,320	,,	,,	7½	Do. A. Ord. Stk.	152—155	..	5 0 0
450,000	20	Oct. 15	10	British	42½—43½	..	4 11 11
109,000	Stk.	Aug. 27	6	Bromley, Ord. 5 p.c.	114—116	..	5 3 5
165,700	,,	,,	4½	Do. do. 3½ p.c.	84—86	..	5 4 8
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	11—11½	..	6 1 9
250,000	Stk.	June 26	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	July 15	7½	Cagliari, Ltd.	25½—26½	+½	5 9 5
100,000	10	—	—	Cape Town & Dis., Ltd.	4¼—⅜	+½	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	5—6	..	7 10 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	47—49	..	6 2 5
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	98—80	..	5 12 6
157,150	Stk.	Aug. 13	5	Chester 5 p.c. Ord.	108½—110½	..	4 12 7
1,193,280	Stk.	Aug. 27	5½	Commercial 4 p.c Stk.	100—103	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103—105	..	4 15 3
475,000	,,	June 26	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5
800,000	Stk.	June 12	6½	Continental Union, Ltd.	109—111	..	5 17 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—142	..	4 18 7
460,170	Stk.	—	5	Derby Con. Stk.	122—124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	Sep. 30	5	East Hull 5 p.c. Ord.	98—100	..	5 0 0
486,090	10	July 15	12	European, Ltd.	23½—24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	17—17½	..	5 2 11
15,182,590	Stk.	Aug. 13	4/10/8	Gas-light and Coke	4 p.c. Ord.	..	4 9 9
					3½ p.c. max.		
					4 p.c. Con. Pref.		
					3 p.c. Con. Deb.		
2,600,000	,,	,,	3½		89—90	..	3 17 9
3,799,735	,,	,,	4		100—107	..	3 14 9
4,193,975	,,	June 12	3		85½—86½	..	3 9 4
258,740	Stk.	Sep. 11	4½	Hastings & St. L. 3½ p.c.	95—97	..	4 17 11
82,500	,,	,,	6¼	Do. do. 5 p.c.	113—115	..	5 8 8
70,000	10	Oct. 15	11	Hongkong & China, Ltd.	18—18½	..	5 18 11
123,500	Stk.	Sep. 11	6½	Ilford "A" and "C"	131—133	..	4 17 9
65,780	,,	,,	5	Do. "B"	103—105	..	4 15 3
51,000	,,	June 26	4	Do. 4 p.c. deb.	104—106	+1	3 15 6
4,940,000	Stk.	Nov. 13	8	Imperial Continental	180—182	−1	4 7 11
473,600	Stk.	Aug. 13	3½	Do. 3½ p.c. Deb. Red.	95—97	..	3 12 2
195,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.	120—122	..	4 18 4
561,000	Stk.	Aug. 27	10	Liverpool United A	226—223	..	4 7 9
718,100	,,	,,	7	Do. B	166—168	..	4 3 4
306,083	,,	June 26	4	Do. Deb. Stk.	106—108	+2	3 14 1
75,000	5	June 26	6	Malta & Medn., Ltd.	4⅜—5	+¼	6 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 13	3½	Monte Video, Ltd.	11½—12	..	5 16 8
1,775,892	Stk.	July 30	4/12/6	Newc'tle & G'tesh'd Con.	108—110	..	4 4 1
418,460	Stk.	June 26	3½	Do. 3½ p.c. Deb.	92—93	..	3 15 3
15,000	10	Aug. 27	10	North Middlesex 10 p.c.	23—26½	..	4 17 6
55,940	10	,,	7	Do. 7 p.c.	13½—14	..	5 0 0
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	137—139*	..	5 15 1
60,000	5	Sept. 30	8	Ottoman. Ltd.	6½—6⅝	..	6 5 6
31,800	53	Aug. 27	13	Portsea Island A	138—140	..	4 18 6
60,000	50	,,	13	Do. B	132—134	..	4 17 0
100,000	50	,,	12	Do. C	122—124	..	4 16 9
114,800	50	,,	10	Do. D and E	104—106	..	4 14 4
398,490	5	Oct. 29	7	Primitiva Ord.	5⅛—6⅛	..	5 15 6
796,980	5	July 30	5	Do. 5 p.c. Pref.	5⅛—5⅛	..	4 16 5
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	94—96*	..	4 5 4
1,000,000	10	Oct. 15	8	River Plate Ord.	13—13¼	..	6 0 9
312,650	Stk.	June 26	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 30	8	San Paulo, Ltd.	14—14¼	..	5 12 3
125,000	50	July 1	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
135,000	Stk.	Sept. 11	10	Sheffield A	240—242	..	4 2 8
209,984	,,	,,	10	Do. B	240—242	..	4 2 8
523,500	,,	,,	10	Do. C	240—242	..	4 2 8
70,000	10	Oct. 29	10	South African	13—13½	..	7 8 2
6,429,895	Stk.	Aug. 13	5/6/8	South Met., 4 p.c. Ord.	119½—120½	..	4 8 6
1,895,445	,,	July 15	3	Do. 3 p.c. Deb.	85½—86½	..	3 9 4
209 823	Stk	Aug. 31	8	South Shields Con. Stk.	153—155	+1	5 3 3
05,000	Stk.	Aug. 13	5/6/8	S'th Suburb'n Ord. 5 p.c.	117—119	..	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	121—123	..	4 1 4
117,058	,,	July 15	5	Do. 5 p.c. Deb. Stk.	124—126	..	3 19 4
502,310	Stk.	Nov. 13	5	Southampton Ord.	107—109	..	4 11 9
120,000	Stk.	Aug. 13	6¾	Tottenham and Edmonton	A 5 p.c.	..	4 19 3
398,940	,,	,,	5¾		B 3½ p.c.		
149,470	,,	June 25	4		4 p.c. Deb.		
182,380	10	June 12	8	Tuscan, Ltd.	102—104	..	3 16 11
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	10½—10⅝	..	7 14 3
193,742	Stk.	Aug. 27	5	Tynemouth 5 p.c. max.	100—101	..	4 19 0
255,636	Stk.	Aug. 27	6¼	Wandsworth and Putney	B 3½ p.c.	..	4 12 7
79,416	,,	June 26	3		3 p.c. Deb. Stk.	..	5 0 0
845,872	,,	Aug. 27	5¾	West Ham 5 p.c. Ord.	105—108	..	3 18 11
185,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	+2	4 14 11
228,300	,,	June 26	4	Do. 4 p.c. Deb. Stk.	104—106	..	4 0 8

Prices marked * are "Ex div."

prices are gradually declining. No sales are reported in London; but it is doubtful whether the value is over 19s. for January-June delivery. On the east coast, business has been done at 18s. 6d. for prompt delivery. In other quarters, pitch has been sold at 18s. 9d. for delivery all over next year. In Manchester and Liverpool, nothing of importance has transpired; while at other ports on the west coast the market is weak. In Swansea, business has been done at very low figures for delivery to the end of September next. On the Continent, sales have been made at equal to 18s. 9d. England for delivery over 1909; while at a basis of 20s., business is reported to have been done over the first six months of 1910. Creosote is steady. Business has been done in London for prompt delivery at 2¾d.; but for January-June, 2⅞d. to 3d. is asked. In the North, some quantity was offered at 2⅝d. for spring delivery, but was declined. Benzol 90 per cent. continues quiet, and business is reported in the North for prompt delivery at 6d. per gallon, casks included. In London, the manufacturers would accept 7d., but cannot obtain this figure. Benzol 50-90 per cent. is fairly steady, and 7⅜d. has been taken in the North for January-June delivery. Toluol is firm, and there is a good demand, especially in the North, for delivery all over next year. Solvent naphtha is steady, but there is no increase in price. Heavy naphtha is quiet, and there are not many inquiries for same. Carbolic acid continues weak, and Continental consumers report having purchased at the equivalent of 1s. f.o.b. London. Refined naphthalene is very depressed; and salts maintain their price owing to the demand for creosote.

The average values during the week were: Tar, 11s. 3d. to 15s. 3d., *ex* works. Pitch, London, 19s. to 19s. 6d.; east coast, 18s. 3d. to 18s. 9d.; west coast, 17s. 6d. to 18s. 6d. Mersey ports; 17s. 6d. to 17s. 9d. other ports. Benzol, 90 per cent., casks included, London, 6¾d. to 7d.; North, 6d. to 6¼d.; 50-90 per cent., casks included, London, 7⅜d. to 8d.; North, 7¼d. to 7½d. Toluol, casks included, London, 9d. to 9¼d.; North, 8½d. to 9d. Crude naphtha, in bulk, London, 3¾d. to 4d.; North, 3½d. to 3⅝d.; solvent naphtha, casks included, London, 11½d. to 11¾d.; North, 10½d. to 10⅝d.; heavy naphtha, casks included, London, 11d. to 11¼d.; North, 10d. to 10¼d. Creosote, in bulk, London, 2¾d. to 2⅞d.; North, 2⅝d. to 2¾d. Heavy oils, in bulk, 3¼d. to 3 3/16d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 0¼d. to 1s. 0½d.; west coast, 1s. to 1s. 0¼d. Naphthalene, £3 10s. to £6 10s.; salts, 35s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is quiet, and prices have declined throughout the past week. Business has been done in London upon Beckton terms at £10 17s. 6d.; while the principal Gas Companies now quote £11 10s. for January-June delivery. In Hull, the best makes have been sold at £11, and other qualities have been sold at £10 17s. 6d. to £10 18s. 9d. In Liverpool, £11 to £11 1s. 3d. has been accepted; while in Leith business is reported at £11 2s. 6d.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade in the North shows more activity, but irregularly distributed in some of the branches. Best Northumbrian steam coals are lower, and may be quoted as from about 10s. 3d. to 10s. 6d. per ton f.o.b., according to the period of delivery. Second-class steams are relatively steady at from 9s. 6d. to 10s.; and steam smalls are from 4s. 9d. to 5s. 9d. The output at the collieries is fairly good, and is well taken up for this season of the year. As to gas coals, the demand has further improved, and is now about at its fullest, both for local use and for shipment; but the supply seems ample, especially for the second classes. Durham gas coals vary in price from 9s. to 10s. 1½d. per ton f.o.b., according to kind, for the usual qualities, and up to about 10s. 9d. for Wear "specials." Among the forward sales, there is one for Bari, for 10,000 tons—the delivered price at that Italian port being given as about 16s. 9d. per ton. The contract for gas coals for Stockholm is now in the market—the quantity being some 120,000 tons—for next year; and that for the city of Gothenburg is also asked for. The result of these is waited for with interest. Coke is generally steady; but gas coke is in large supply, and is weaker at from about 14s. to 14s. 6d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

The market has been quiet. Ell for export is in poor request, and a ready outlet for it is difficult. Splint is, if anything, more plentiful. Steam coal is in fair demand, except for the smaller sorts. The prices quoted are: Ell 10s. to 11s., splint 10s. 6d. to 10s. 9d., and steam 10s. to 10s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 266,009 tons—a decrease of 20,120 tons upon the previous week, but an increase of 5656 tons upon the preceding week of last year. For the year to date, the total shipments have been 13,440,825 tons—a decrease of 169,849 tons upon the corresponding period.

Stokers' Wages and Holidays at Oldham.—A deputation of stokers from the various gas-works of the Oldham Corporation lately waited upon the Gas Committee to support an application for an increase in their wages and annual holidays with pay (see *ante*, p. 568). After the men's case had been fully stated, a long discussion took place on the various points at issue; and it was finally agreed that further information should be supplied regarding the position in various towns in which it was stated that stokers are better paid than in Oldham. The deputation have been informed that no concession can be made in respect of holiday privileges in face of the resolution passed some time ago at a joint meeting of the Committees of the Corporation employing labour.

"A. B. C."

Richmond's Gas Fires.

Eleven different Sizes, 3 different Designs, and with parts **all** interchangeable one with the other. The requirements of any Rooms of a House are met by this Series. Hiring, Hire Purchase, or Sale is made Simple, Safe, and Profitable. If a part is required for renewal you can at once supply without loss of time, confusion, or correspondence. Our Sales are 100 per cent. more this Season, and we expect still further success. Over 100 Gas Undertakings have placed these on their Hire List this Season and many more are Selling them.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.

London Offices and Show Rooms: 132, Queen Victoria Street, E.C. *General Offices and Works: Warrington.*

Birmingham Gas Department and Traders.

The Birmingham and District Ironmongers' Association some time ago wrote to Mr. G. Hampton Barber, the Secretary of the Gas Department, objecting to the proposal of the Gas Committee to supply mantles and clean burners. The communication was acknowledged; but owing to the absence of Mr. Barber, no definite reply was received on the matter. At a meeting of the Association last week, the Secretary (Mr. J. H. Meakin) read a letter received recently from Mr. Hampton Barber on the subject, and observed that the writer seemed to have evaded the question in his reply. Mr. Barber wrote that he had submitted the letters from the Association to the Gas Committee; and he was instructed to say that the Committee were not competing in the sale of gas fittings or appliances to the detriment of local tradesmen, but, on the contrary, the department constantly rendered assistance to tradesmen by suggesting to private consumers improvements that might be effected in their lighting arrangements, involving the purchase of new fittings and burners, for which orders were not placed with the Gas Department. Further, the department in recent years had placed with master gas-fitters numerous orders for work to be executed on the premises of the consumers; and the extent of this would be apparent when it was stated that, whereas in the year 1907 the department paid the tradesmen for such work the sum of £1317, the amount so paid for the last ten months was £2600. No further action was proposed.

Ilfracombe Public Lighting.—The tender of the Ilfracombe Gas Company has been accepted by the Urban District Council for lighting the town for the sum of £687 7s. 6d. per annum for five years. The lamps, as a whole, are to be of 100-candle power; but there are certain exceptions in which a higher power will be necessary. The Company are to fit all the lamps with automatic controllers. The equivalent tender of the Electric Light Company was £1700—£1050 for light, and the rest for capital charges.

The Labour Party and Trade Union Funds.—The Labour Party met last Wednesday evening at the House of Commons, and passed a resolution affirming that the judgment of the Court of Appeal, if upheld by the House of Lords, would place Trade Unions in an intolerable position, and pledging both branches of the Labour movement to take every step necessary to restore to the Unions full liberty of action to adopt whatever legitimate course may be necessary for the protection of the industrial interest of their members.

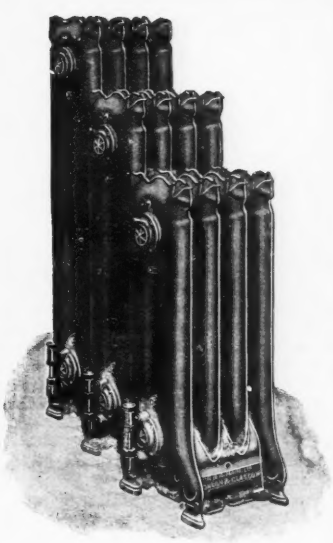
Gas for Destructor Lighting at Acton.—The Works Committee of the Acton Urban District Council have had submitted to them by the Electrical Engineer a further estimate for lighting the dust destructor by electricity (reducing the number of hours), and a corresponding estimate for gas. The cost of the former for 1500 to 2500 lighting hours per annum (1346-candle power) was estimated at £29 12s. 6d., and the cost of lighting by gas (2620-candle power) for the same number of hours was estimated at £28 3s. 7d. The Surveyor's estimate of the cost for gas was £42 10s., and for electricity £109. The cost of lighting by gas (2620-candle power) 3800 hours per annum, he estimated at £63 10s., and by electricity (1796-candle power), 3800 hours per annum, at 2d. per unit, £71 11s. 6d. The Committee have decided that the buildings and the approach road shall be lighted by gas.

Cement Pipes.—According to a paragraph in the current number of the "Engineer," a new system of making cement pipes has recently been introduced in Germany. The cement of which they are manufactured has usually an admixture of asbestos, and often also a reinforcement of expanded sheet metal is added. The method of manufacture is believed to be different from any that has previously been utilized. It is claimed for these pipes that their materials are proof against decay, water, fire, changes of temperature, and the action of bacilli or of constituents in the surrounding earth, as well as against the attacks of animal and vegetable organisms. They are also poor conductors of heat, electricity, and sound. They are stated to be suitable for tunnel sections, sewers, cable conduits, drainpipes, mines, linings for wells, chimneys, pillars, and even for beams in fireproof construction.

Emsworth Gas Company, Limited.—The annual general meeting of this Company was held on Monday last week, when the accounts presented showed that the quantity of coal carbonized in the year to Sept. 29 last was 904 tons, and that the production of gas was 7,606,700 cubic feet, of which 6,958,400 cubic feet were sold; compared with 772 tons of coal carbonized, 7,066,200 cubic feet of gas made, and 6,675,200 cubic feet sold, in the preceding year. The financial statement, which disclosed a revenue profit considerably short of the amount required for dividends, and the working results were severely criticized; but they were ultimately adopted, and it was unanimously agreed to declare full dividends instead of the reduced ones proposed by the Directors—there being about £1100 of undivided profits to draw upon. The Chairman (Mr. A. G. Tatchell), who presided, was re-elected; and Mr. T. E. Pye, the Engineer and Manager of the Chichester Gas Company, was appointed a Director.

Protecting Water-Works Gathering Grounds.—The Bolton Town Council, at their meeting last Wednesday, discussed at length a proposal made by Mr. W. H. Lever, M.P., to defray the cost of constructing a road several miles in length over the moors from Belmont to Rivington, and on the estate recently acquired by the Bolton Corporation, at a cost of upwards of £100,000, for water-works purposes. The Water Committee recommended that the grant of land for the purposes of the projected road should not be made; this decision being arrived at on the ground that the Corporation have no right to utilize the land for other than water-works purposes. The Town Clerk supported this view; stating that local authorities were compelled to act in accordance with their statutory powers. The Chairman of the Water Committee (Mr. J. T. Cooper) said they deemed it right, in the public interest, to preserve this portion of the gathering-ground from any possibility of contamination. He explained that the Corporation were going to construct a road which would secure this. The Committee's recommendation was approved. It was Mr. Lever's idea, in having the road constructed, to find work for a portion of the unemployed, and provide the public with a fine moorland walk. The cost to Mr. Lever, it was stated, would be about £5000.

RADIATORS



PLAIN OR ORNAMENTAL.

WHEN A TRAVELLER TELLS YOU HE IS SELLING THE BEST RADIATOR, YOU MAY BE SURE THAT IT IS

THE "ST. MUNGO" GAS HEATED STEAM RADIATOR

HE IS TALKING ABOUT.

FITTED WITH GAUGE GLASS,
GAUGE GLASS PROTECTOR,
GAS & AIR ADJUSTER,
AUTOMATIC AIR VALVE.
AUTOMATIC GAS REGULATOR,
FIXED CAST-IRON BASE,
AND ALL THAT IS BEST
IN RADIATOR CONSTRUCTION.

HIGHEST GRADE.

R & A. MAIN Ld.,

LONDON, GLASGOW, FALKIRK.

The Largest Office Building in the World.—The Peoples Gaslight and Coke Company of Chicago have obtained permission for the construction of what the architects claim will be the largest office building in the world. It will be erected at the corner of Adams Street and Michigan Avenue, will be twenty storeys high, and contain 7,930,000 cubic feet of air space.

Reduction in Price at Leighton Buzzard.—The Directors of the Leighton Buzzard Gas Company have reduced the price of gas by 2d. per 1000 cubic feet as from the 1st of October, making the net price now 3s. 3d. The announcement is made prominently in a local paper; and the Company's Secretary and Manager (Mr. C. F. Ruggles) at the same time emphasizes the advantages of gas for cooking and heating purposes.

Private Bills in Parliament.—The period for depositing at the House of Commons plans relating to Private Bills to be promoted in Parliament in the ensuing session expired on the 30th ult. By that time plans had been received with reference to 143 Bills and Provisional Orders, divided as follows: Railways, 23; tramways, 5; Provisional Orders, 72; miscellaneous, 43. Last year there were plans for 131 Bills—viz., Railways, 14; tramways, 8; Provisional Orders, 65; miscellaneous, 46.

Refusing an Order for Electricity.—Local feeling was greatly aroused by the action of the Sunderland Corporation Electricity Department, as recorded last week (p. 646), in refusing to supply a tradesman who had formerly used electric light with the necessary current to run a small motor in connection with a high-pressure gas installation; the excuse being put forward that the electricity was merely required as "an adjunct to a rival light." The action was generally condemned in the town; and now the Committee have decided that the current must be supplied, and at the same price as is charged for lighting.

Carburetted Water Gas at Wigan.—When moving the adoption of the minutes of the Gas Committee at the monthly meeting of the Wigan Borough Council, Mr. Seddon stated that the work of erecting the carburetted water-gas plant had been completed; and he expressed the opinion that it would meet a great want, inasmuch as in two or three hours they would be able to furnish a supply which under the old conditions it would take two or three days to provide. An inspection of the plant would take place to-morrow, Wednesday; and he would be glad if any member of the Council would join the Committee on that occasion. He thought the new system would prove profitable to the town, and that it would be a boon to the gas consumers.

The Art of Tendering.—Writing on this subject, the "Lincolnshire Chronicle" truly remarks that the following summary of the tenders received in connection with the Elkesley water scheme of the Lincoln Corporation reveals an amazing difference in the amounts. Contract No. 1: Rollinson and Sons, £22,996 0s. 9d.; Smith and Son, £15,829 9s. 7d.; Nunn and Co., £11,943 16s. 5d.; Chapman and Sons, £9717 8s. 10d.; Timmins and Son, £8845 10s. 10d.; Cooke and Co., £8750: J. Sangwin, £8740 12s. 8d.; Thomas Matthews, £8175 14s. 9d.; Potter and Co., £7768 11s. 8d. (accepted); J. Pennington, £7345 5s.; and the New England Boring Company, £6738 2s. 7d. Contract No. 2: J. Pennington, £388 2s.; W. Rollinson and Sons, £183 15s.; A. E. Nunn and Co., £172 10s.; A. Williams and Co., £142 12s.; C. Chapman and Sons, £132 10s.; T. Matthews, £120; W. Cooke and Co., £103 10s.; E. Timmins and Sons, £71 10s.; W. Pattinson and Sons, £81; J. T. Barnes, £72; A. C. Potter and Co., £72 12s. 6d.; J. E. Noble, £46 5s.; E. Smith and Son, £44 2s.; New England Boring Company, £42 16s. (accepted); and J. Sangwin, £41 10s.

Belfast Gas-Works Site.—Referring at the meeting of the Belfast County Borough Council to the proposed gas-works extension, Mr. J. A. Doran, the Chairman of the Committee, said that eight alternative sites had been suggested. Tate's ground, ground at Sydenham (Corporation), Ormeau Park, ground at Haypark (Messrs. Coates and Martin), Donegall Road, Cranmore, Twin Island, and the Ormeau Park (diverted river). There must be no sentiment in selecting the site. It was the ratepayers who had to be considered; and so far as he was concerned there would be no "job." They were in a very difficult position. They had only one-half day's supply for the whole of the city; and if anything went wrong, the result would be disastrous to the public and to the Corporation as well. They were put to an enormous cost in handling residuals at the works. At the present time, they were paying 75 per cent. more than they should be under this head; and surely the ratepayers would not object to an extension which would result in a charge of 2s. 3d., less 15 per cent., giving place to a rate of 1s. per 1000 cubic feet. Mr. Squire said he did not look forward to the Corporation being able to give gas to the ratepayers at 1s. per 1000 cubic feet. He believed that such a reduction would be entirely wrong.

APPLICATIONS FOR LETTERS PATENT.

25,158.—Rowson, J., "Inverted burner nozzle." Nov. 23.
25,180.—Merivale, C. H., "Ascension-pipes." Nov. 23.
25,198.—Lamb, H., "Acetylene generators." Nov. 23.
25,207.—Roessler, A. C., "Gas-burners." Nov. 23.
25,350.—M'Clymont, H. R., and Beaumont, R. J., "Gas testing and measuring apparatus." Nov. 25.
25,541.—Adolfsson, A. E., "Pump or meter." Nov. 26.
25,549.—Still, W. M., and Adamson, A. G., "Mantles." Nov. 26.
25,587.—Lake, T. E., "Globe-carrier." Nov. 27.
25,650.—D'Ivernois, G. H., "Igniting, turning down, and extinguishing gas-jets." Nov. 27.
25,651.—Fletcher, A., "Pressure-gauge adapted for use as a quantity-meter." Nov. 27.
25,702.—Gödelmann, N., "Mantles and supports." Nov. 28.
25,718.—Poppe, P. A., "Governors." Nov. 28.
25,735.—Booth, G., "Automatic cut-off for gas-cocks." Nov. 28.
25,736.—Temple, E., "Gas generating and purifying apparatus." Nov. 28.

The PARKINSON STOVE Co., Ld.

(*Incorporating Maughan's Patent Geyser Co.*),

Have pleasure in announcing that they have opened

OFFICES AND SHOW-ROOMS

AT

129, High Holborn, W.C.

(CLOSE TO KINGSWAY.)

Their Customers are invited to call and inspect Samples of their High-Class

GAS COOKERS,
FIRES,
RADIATORS, &C.,
ALSO
MAUGHAN'S GEYSERS,
AND OTHER
WATER HEATING SPECIALITIES.

BIRMINGHAM: Stour Street, Spring Hill.

LONDON: 129, High Holborn, W.C.

Burnley and Vertical Retorts.—The Burnley Town Council have had under consideration several extensive schemes, involving an expenditure of £31,000. They include the construction of an installation of vertical retorts, at a cost of £10,800.

Temptation of the Gas-Meter.—In the course of a case recently heard at the West Ham Police Court, a solicitor mentioned that there had been no fewer than 3500 robberies from prepayment gas-meters belonging to the Commercial Gas Company.

Sales of Shares.—At a recent local auction sale, some shares in the Eastbourne Gas Company were disposed of at the following prices: Fourteen £10 original shares, £34 5s. to £34 17s. 6d. each; eighteen £10 "C" shares, £34 10s. to £34 15s. each; and sixty £10 "B" shares, £27 10s. to £27 12s. 6d. each. At a sale last week, 100 5 per cent. preference shares of £10 each in the Raunds Gas Company were sold at an aggregate price of £1116.

Gas Explosion at Oxford.—Owing to an escape from a 4-inch gas-main running through Becket Street, Oxford, a serious explosion occurred shortly after ten o'clock last Sunday evening in the house of Mr. W. E. Thomas; but, though considerable damage was done to one room, the occupants were fortunately uninjured. It appears that the main was fractured just in front of the house, and the escaping gas percolated through the soil and collected beneath the floor of the room affected, which bore the brunt of the explosion.

At a window-dressing competition recently held at Maidstone, the Gas Company took the first prize in the class open to the ironmongery trade.

At Worthing, complaints are being made as to the public lighting, it being asserted that Tarring, one of the parish districts, has been left in total darkness. Some of the members of the Parish Council are recommending the abandonment of arc lamps for incandescent bracket lamps; it being asserted that much of the illumination from the former is lost among the trees.

The formal inauguration of a new storage reservoir for Appleby, which has been erected at the head works of the supply, took place last week. Alderman J. S. Rigg, Chairman of the Water Committee, gave an outline of the scheme, after which the Mayoress (Mrs. Wood) turned the water on into the reservoir. Alderman Rigg, on behalf of the Corporation, presented the Mayoress with a gold curb bracelet.

For the first time for some years, the Warrington Water-Works are for the past six months able to show a balance on the right side. The working for the twelve months to March last resulted in a loss of over £1000; but for the half year just ended there is a net profit of £863. In view of the increasing demands, a big extension scheme will, says the Chairman of the Committee (Alderman Evans), have to be considered by the Council.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEERING DRAUGHTSMAN. Preston Gas Company. Applications by Dec. 23.
ESTIMATING DRAUGHTSMAN. No. 5032.
DRAUGHTSMAN. No. 5031.
AGENTS (GAS AND WATER APPARATUS). No. 5030.
GAS-FITTER. Dorking Gas Company.
STREET-LAMP MAKERS. No. 5033.

Situations Wanted.

RENTAL CLERK OR COLLECTOR. No. 5029.
REPRESENTATIVE (IRON OR COAL FIRM). No. 5025.

Ross on "Air as Fuel," &c.

COPY OF 1875 EDITION WANTED. 9, Agnew Street, Lytham.

Patent for Disposal and Licences to Work.

CARBURETTING APPARATUS. J. P. O'Donnell, Palace Chambers, S.W.

Stocks and Shares.

PROVINCE OF BUENOS AYRES WATERWORKS (CONSTRUCTION SYNDICATE, LIMITED. New Issue.

TENDERS FOR

Fire-Clay Goods (*see also* General Stores).

BURTON-ON-TRENT CORPORATION. Tenders by Dec. 29.
LEICESTER CORPORATION. Tenders by Dec. 19.
NOTTINGHAM GAS DEPARTMENT. Tenders by Dec. 17.
SALFORD GAS DEPARTMENT. Tenders by Dec. 17.

General Stores, &c.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY. Tenders by Dec. 27.
NOTTINGHAM GAS DEPARTMENT. Tenders by Dec. 17.

Meters, &c.

NOTTINGHAM GAS DEPARTMENT. Tenders by Dec. 17.

Pipes, &c.

LEICESTER CORPORATION. Tenders by Dec. 19.
NOTTINGHAM GAS DEPARTMENT. Tenders by Dec. 17.

Tar and Liquor.

BRIDGEWATER COLLIERIES COKE-WORKS. Tenders by Dec. 22.
HECKMONDWIKE GAS COMPANY. Tenders by Dec. 15.
WORKSOP GAS COMPANY. Tenders by Dec. 29.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."
United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

"NUGEPE" GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams:—
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OXIDE OF IRON (BOG ORE).
ANY QUANTITY. ANY PORT. ANY STATION.
DONALD M'INTOSH,
110, CANNON STREET, LONDON.

DUTCH OXIDE OF IRON.

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THE First Dutch Bogore Co., Ltd.,
NYMEGEN, HOLLAND.
General Manager (for England and Wales)—
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J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

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(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

KRAMERS AND AARTS WATER-GAS PLANT.
K. & A. WATER-GAS COMPANY, LTD.,
39, VICTORIA STREET, S.W.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

This Prospectus has been filed with the Registrar of Joint Stock Companies.

With the sanction of the Board of Trade, which has been given under the Companies Act, 1907, interest will be paid at the rate of 4 per cent. per annum upon the capital for the time being paid up during the construction of the Works and for six months thereafter, the whole period not to exceed two years.

The LIST opened on Monday, the 7th day of December, 1908, and will close on or before Wednesday, the 9th day of December, 1908.

THE

PROVINCE OF BUENOS AYRES WATER-WORKS (CONSTRUCTION) SYNDICATE, LIMITED.

(Incorporated under the Companies Acts, 1862 to 1908.)

WORKS FOR THE PROVISION OF WATER TO SUBURBS OF BUENOS AYRES, COMPRISING AVELLANEDA, LOMAS DE ZAMORA, TEMPERLEY, BANFIELD, AND ADROGUE.

CAPITAL - - - - - £224,400.

Divided into 44,000 Ordinary "A" Shares of £5 each, £220,000, and 88,000 Ordinary "B" Shares of 1s. each, £4400—£224,400.

Out of the profits which this Syndicate shall determine to distribute in each year the Ordinary "A" Shares will be first entitled to a Non-Cumulative Dividend of 7 per cent. per annum on the amount for the time being paid up on such Shares; the surplus profits will be distributed as to one half amongst the Ordinary "A" Shares and the other one-half amongst the Ordinary "B" Shares. The Ordinary "A" Shares will also have a preference as regards capital over the Ordinary "B" Shares, and after repayment of the capital paid up on both classes of Shares, will be entitled to one-half of the surplus assets, the holders of the ordinary "B" Shares being entitled to the other half.

Issue of 44,000 Ordinary "A" Shares of £5 each at Par	**£220,000**
With the right to each subscriber to apply for and have allotted one "B" Share for every "A" Share subscribed	2,200
	£222,200

Payable as to ORDINARY "A" SHARES: On Application, 10s. per Share; on Allotment, 10s. per Share. The remaining £4 per Share as and when required for the Works, of which it is estimated only £2 will be required during the first nine months of construction.

As to ORDINARY "B" SHARES: On Application, 1s. per Share.

Payment in full may be made on allotment. Interest at 4 per cent. per annum will be allowed on amounts prepaid. The 88,000 Ordinary "B" Shares of 1s. each will be dealt with as follows:—33,000 issued to the Vendor Company as fully paid up, 11,000 are subject to the option hereinafter mentioned, and 44,000 will be available for subscription share for share by the subscribers of the present issue of 44,000 Ordinary "A" shares.

DIRECTORS.

John Conrad im Thurn, Esq. (J. C. im Thurn and Sons), 1, East India Avenue, Leadenhall Street, E.C., Merchant (Director of the Buenos Ayres (New) Gas Company, Limited, and The South Barracas (Buenos Ayres) Gas and Coke Company, Limited).

Ross Pinsent, Esq., 16, Maresfield Gardens, Fitzjohn's Avenue, N.W., Gentleman (Director of the Buenos Ayres (New) Gas Company, Limited; the South Barracas (Buenos Ayres) Gas and Coke Company, Limited; and the Consolidated Water Works of Rosario, Limited).

Arthur Telford Simpson, Esq., J.P., M.Inst.C.E., M.Inst.Mech.E., 38, Parliament Street, Westminster (Chairman of the West Surrey Water Company, Director Babcock and Wilcox, Limited).

BANKERS.

In London—The Union of London and Smith's Bank, Limited, 50, Cornhill, E.C.

In Argentina—The British Bank of South America, Limited.

SOLICITORS.

Messrs. Walter Webb and Co., 31, Budge Row, E.C.

BROKERS.

Messrs. Laurence, Sons, and Gardner, 13, Copthall Court, E.C.

AUDITORS.

Messrs. Arthur Goddard and Co., 46, London Wall, E.C.

SECRETARY AND OFFICES.

J. M. Macmorran, 1, East India Avenue, E.C.

PROSPECTUS.

Having obtained a Special Act of Parliament in the Session 1905, the South Barracas (Buenos Ayres) Gas and Coke Company, Limited (hereinafter called "the South Barracas Gas Company"), whose Registered Office is situate at 1, East India Avenue, London, E.C., caused application to be made to the Authorities of the Province of Buenos Ayres for a Concession for the supply of water to the districts which it supplies with gas, and in due course a law was passed by the Legislature of the Province of Buenos Ayres, dated 29th September, 1905, granting a Concession to Senor Mariano Obarrio, of Buenos Ayres, who afterwards assigned it to the Company's nominee. A translation of the Concession authorising the installation of works for the provision of water in the Towns of Avellaneda, Lomas de Zamora, Banfield, Temperley and Adrogué, is enclosed with and forms part of this Prospectus.

The South Barracas Gas Company secured the services of a competent Engineer, Mr. H. L. Stevens, A.M.I.C.E., and instructed him to proceed to Argentina and make a thorough study of the subject, bore for water, and prepare plans and obtain their approval by the Provincial Authorities. Mr. Stevens was occupied eight months in Argentina upon these matters; he then, having satisfactorily carried out his mission, returned to this country, and made his report as follows:—

THE SOUTH BARRACAS (BUENOS AYRES) GAS AND COKE COMPANY, LIMITED,
1, East India Avenue, Leadenhall Street, London, E.C.,
29th January, 1908.

Gentlemen,

Water Supply Scheme for the Suburbs of Buenos Aires, known as Avellaneda, Lomas, Temperley, Banfield, and Adrogue.

Having been instructed by you to prepare a Scheme of Water Supply for the above districts, based on the conditions of a Concession obtained by you from the Government of the Province of Buenos Aires, I went into the matter and prepared the necessary plans and estimates. These have been approved by the Engineering Department of the Government and now bear the signature of approval of the Engineers, Minister of Public Works, and the Governor of the Province.

AREA OF CONCESSION.—The area which the Concession gives the right of supply to immediately joins the city boundary to the South, and, besides embracing the towns above mentioned and their suburbs, can readily be extended to include some smaller rapidly developing towns—comparatively short extensions of the mains at present allowed for being all that is necessary to give them a supply.

AVELLANEDA, a town of some 20,000 inhabitants, is essentially industrial, and is immediately adjacent to the City of Buenos Aires, with which it is connected by Railway, Tramways, and Road Bridge and Ferries crossing the river Riachuelo. In this district are situated the Buenos Aires South Dock, the Central Produce Market, Match Factories, Flour Mills, Cold Stores, and Shipbuilding Yards. It may be safely estimated that the population will double itself in ten years from the inauguration of the supply.

LOMAS, TEMPERLEY, BANFIELD, and ADROGUE.—These towns embrace a population of about 30,000, and are residential suburbs, situated on the Great Southern Railway Company's Main Line, about nine miles from the City terminus Plaza Constitucion. The progress these suburbs is making is amply illustrated by figures obtained from the Mayor of the Municipality which controls Lomas, Temperley, and Banfield. He states that permits have been given to builders for the erection of 900 houses, the plans for which were submitted during the eight months ending 31st August, 1907.

SOURCE OF SUPPLY.—The source of the supply is a bed of sand 25 metres thick, at a depth of about 40 metres from the surface. Wells sunk in this are semi-artesian, the water rising to within about 10 metres of the ground surface. This bed of sand is of very considerable extent, and is the source of supply of, amongst other towns, La Plata, the capital of the Province, 30 miles to the South-East, Mercedes, 50 miles to the West, and Belgrano and Flores, important Northern and Western suburbs of Buenos Aires.

QUALITY OF WATER.—Trial borings have been put down on the lands acquired by the Concessionnaire, and samples of the water taken and analyzed by the Government Analyst. On his report the Government Engineers approved the sites purchased. You have in your possession analyses of similar samples, made by Dr. Arata, of Buenos Aires, his report being that the waters are fit for alimentation.

COST OF WORKS.—I estimate the total cost of the works to be £183,000.

NUMBER OF HOUSES SERVED BY MAINS.—From an actual count made in January, 1906, there are 6750 houses which will be served by the proposed mains. By the date of the inauguration of the supply I estimate there will be 7800 houses to be served by the network of mains at present in contemplation. In addition, adjacent squares are being built up, so that the first batch of extensions of mains will materially increase these figures.

REVENUE.—Taking the average rent per house as £60 per year, and this is a distinctly low estimate, and the Water Rate at 6 per cent. on the rents, as fixed by Article No. 28 of the Concession, then the probable revenue may be estimated as follows:—

Water Rate = 6 per cent. of rents of 6750 houses at £60	£24,300	0	0
Income from Meter supplies	4,000	0	0
	£28,300	0	0
Estimated Working Expenses	6,250	0	0
Estimated Net Revenue	£22,050	0	0

On the basis of the Estimated number of houses at the inauguration of the Plant:—

Water Rate = 6 per cent. of rents of 7800 houses at £60	£28,080	0	0
Income from Meter Supplies	4,000	0	0
	£32,080	0	0
Estimated Working Expenses	6,250	0	0
Estimated Net Revenue	£25,830	0	0

It will be seen that the estimated revenue based on the existing number of houses only is sufficient to pay more than 10 per cent. on the estimated cost of the work with a liberal margin for contingencies. During the seven months taken by the Government Engineers to consider the plans and estimates submitted, I was able to study, on the spot, the local conditions and prospects and found that there are no difficulties of an engineering character to be got over; the cost of construction will therefore be normal. The Local Authorities are friendly. The estimate of revenue is conservative and the allowance for working expenses sufficient. All the conditions therefore are distinctly favourable to the present and future prosperity of the undertaking.

Yours faithfully,
(Signed) H. L. STEVENS, A.M.I.C.E.

In the month of April last Mr. Stevens returned to Argentina with instructions to carry on the works. In recent letters he informs the Directors of the South Barracas Gas Company that at Lomas the excavation of the well down to the first water-level is completed, and that the contractor is about to put in the concrete foundation for the well lining, and that the excavation of the well at Adrogue is down half-way to the first water. He further says that an additional 1118 houses will require to be provided for, mostly built since the mains plans were prepared.

The South Barracas Gas Company (the Vendor Company and promoter of the Syndicate) has expended or made itself liable for about £25,000 upon the business, including the price paid for three valuable plots of land acquired for the undertaking (believed to have considerably increased in value since the purchase), and £2000 the Caution Money paid under the Concession.

The Vendor Company has entered into a Contract to pay Senor Mariano Obarrio for his services in relation to the obtaining of the Concession £20,000 in the shares of the Working Company, if and when formed to acquire from this Syndicate the works when wholly or partly executed. In the improbable event of this Syndicate determining to carry on the works without forming a Working Company, this payment will be satisfied by the allotment of fully-paid Ordinary "A" Shares of the Syndicate not exceeding in any case £20,000.

The Contract for sale of the Concession provides for the payment to the Vendor Company with interest, of the sums it shall have actually expended or become liable for and for the allotment of 33,000 1s. Ordinary "B" shares fully paid up. The Syndicate also indemnifies the Vendor Company in respect of its payments and liabilities including its engagement to procure to be paid to the said Senor Mariano Obarrio the above-mentioned shares in the Working Company, or in the Syndicate as the case may be, and in respect of certain working contracts entered into in the ordinary course of the business carried on by the Vendor Company or intended to be carried on by the Syndicate, and the Vendor Company agrees to underwrite 10,000 Ordinary "A" and the same number of "B" Shares of the Syndicate upon the terms mentioned below (Agreement No. 1).

It is proposed to continue and complete the construction of the Works on the lowest cash basis, under the superintendence of Mr. Stevens, and when they are completed or nearing completion to form a Working Company to take them over at a price which will represent a profit to the Syndicate, after recouping its outlay with 7 per cent. interest.

The following Agreements have been or will be entered into: (1) An Agreement made the 4th December, 1908, between the South Barracas (Buenos Ayres) Gas and Coke Company, Limited, and the Province of Buenos Ayres Waterworks (Construction) Syndicate, Limited, being the Contract for Sale above-mentioned, and providing for the underwriting of 10,000 Ordinary "A" and the same number of "B" Shares for a commission of 5 per cent., plus 1 per cent. brokerage. (2) An Agreement, made the 2nd March, 1908, between the South Barracas (Buenos Ayres) Gas and Coke Company, Limited, and Mariano Obarrio. This Agreement carries into effect a verbal Agreement in the terms mentioned above, made on behalf of the South Barracas Gas Company with Senor M. Obarrio at the time the Concession was transferred by him to the nominee of that Company. (3) An Agreement made the 4th December, 1908, between the Province of Buenos Ayres Waterworks (Construction) Syndicate, Limited, and Messrs. J. C. im Thurn and Sons, for the underwriting of 20,000 Ordinary "A" and the same number of "B" Shares of the present issue for a commission of 5 per cent., plus 1 per cent. brokerage, and the option to subscribe for 11,000 Ordinary "B" Shares of 1s. each in the Syndicate at par. (4) An Agreement by letter dated 4th December, 1908, from Messrs. Laurence, Sons, and Gardner (the Brokers of the Syndicate) to the Syndicate agreeing to underwrite 14,000 Ordinary "A" and the same number of "B" Shares for a commission of 5 per cent., plus 1 per cent. brokerage, and accepted by the Secretary on behalf of the Syndicate. (5) An Agreement dated 1st January, 1907, between the South Barracas (Buenos Ayres) Gas and Coke Company, Limited, and Herbert Leslie Stevens (as extended by a resolution of the Directors of the Company dated 15th April, 1908), for his employment as engineer.

The contents of the Memorandum of Association, and the names, addresses, and descriptions of the signatories, and the number of shares subscribed for by them, will be found in the fold of this Prospectus, and form part thereof.

The Articles of Association provide: (1) That the Syndicate shall forthwith enter into the first and third Agreements mentioned above, and declare that it is to be no objection to the said Agreements that the first Directors of the Syndicate, or some of them, are also Directors of the South Barracas Gas Company, or otherwise interested in the said Agreements, or that, in the circumstances, they do not constitute an independent Board, or that the Company is the promoter of the Syndicate, and that every member of the Syndicate, present or future, is to be deemed to join the Syndicate on this basis. (2) That the qualification of each Director shall be the holding of 100 Ordinary "A" Shares. (3) That the Directors, other than Managing Directors, shall be paid out of the funds of the Syndicate by way of remuneration for their services, at the rate of £200 per annum for each Director, and an additional £50 to the Chairman (if any), and they shall be entitled to such further remuneration (if any) as the Syndicate in General Meeting shall from time to time determine, and that the Directors shall also be paid their travelling expenses of attending and returning from Board Meetings. (4) That the remuneration of a Managing Director shall from time to time be fixed by the Directors, or by the Syndicate in General Meeting, and may be by way of salary or commission or participation in profits, or by any or all of those modes, and that if any Director, being willing, shall be called upon to perform extra services or to make any special exertions in going or residing abroad or otherwise for any of the purposes of the Syndicate, the Syndicate shall remunerate such Director either by a fixed sum or by a percentage of profits or otherwise, as may be determined by the Directors, and such remuneration may be either in addition to or in substitution for his share in the remuneration above provided. (5) That the minimum subscription upon which the Directors may proceed to allotment is 50 per cent. of the share capital offered for subscription. (6) That on a show of hands every Member present in person shall have one vote, and upon a poll every Member present in person or by proxy shall have one vote for every Ordinary "A" Share and one vote for every five Ordinary "B" Shares held by him.

Possibly the 33,000 Ordinary "B" Shares of 1s. each to be issued to the Vendor Company might be treated as for goodwill.

The preliminary expenses are estimated to amount to £5000.

Mr. J. C. im Thurn and Mr. Ross Pinsent are Directors of the South Barracas Gas Company, and each holds 50 shares of £10 each in that Company. Mr. J. C. im Thurn, as a member of the firm of J. C. im Thurn and Sons, is entitled to the benefits set forth in the above-mentioned agreement (3) under which that firm underwrites 20,000 Ordinary "A" and a corresponding number of "B" Shares.

A translation of the Concession, the Agreements, Report printed above and Memorandum and Articles of Association, may be seen by intending applicants for shares at the office of the Solicitors of the Syndicate, on any day before the closing of the Subscription List, between the hours of 11 a.m. and 4 p.m.

The Syndicate will pay 1s. per Ordinary "A" Share brokerage on applications, other than underwriting applications, bearing a Broker's stamp.

Applications for shares should be made on the form

accompanying the prospectus and sent with the deposit to the Syndicate's Bankers. If no allotment is made the application money will be returned in full. If an allotment is made of a smaller number of shares than that applied for, the balance of the application money will be applied towards the payment of the money due on allotment, and any excess will be returned to the applicant.

Failure to pay any instalment when due will render any instalment previously paid liable to forfeiture.

Prospectuses and Forms of Application can be obtained from the Bankers, Solicitors, and Brokers, and at the Offices of the Syndicate.

Dated 4th December, 1908.

BENZOL
AND
CARBURINE FOR GAS ENRICHING.

ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, Bishopsgate Street Without,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

PINCHBECK'S Meters and Burglar PROOF STRONG BOX.
See illustrated advertisement, Nov. 10, p. I. of Centre.
Pinchbeck Limited, Adams Place, George's Road, Holloway, N.

"HALLITE" Asbestos High-Pressure Sheeting.
Hallite Douglas, Limited, 106, Leadenhall Street, London, E.C.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger.
The one Machine which Discharges and Charges at One Stroke.
See Advertisement, Nov. 17, p. III. of Centre.)
ALDRIDGE AND RANKEN,
9, Victoria Street, Westminster, S.W.
Telegrams: "Motorpathy, London." Telephone: 5118 Westminster.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: Oldbury, Wednesbury, and Stafford.
Address Correspondence and Inquiries to Oldbury, Worcs.
Telegrams: "Chemicals, Oldbury."

BRISTOL RECORDING GAUGES AND THERMOMETERS.

J. W. & C. J. PHILLIPS, 23, College Hill, London, E.C., and 7, Park Square, Leeds.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

DESSAU PATENT VERTICAL RETORTS.
FOR list of Installations, see "Journal," Nov. 3, p. I. of Centre.
THE DESSAU VERTICAL RETORT COMPANY,
Care of Mr. Charles Hunt, Consulting Engineer,
17, Victoria Street, Westminster, S.W.

BROTHERTON & CO., LIMITED.
Offices: City Chambers, Leeds.
Correspondence invited.

LUX'S GAS PURIFYING MASS.
See Advertisement on p. 663.
Friedrich Lux, Ludwigshafen-am-Rhein.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
Joseph Taylor and Co., Central Plumbing Works, Bolton.
Telegrams: Saturators, Bolton. Telephone 0848.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
Read Holliday and Sons, Ltd., Huddersfield.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

AMMONIACAL Liquor wanted.
Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.
Telegrams: "Chemicals."

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "Dacolight London." Telephone: 2336 Holborn.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought.
J. Wilson, Pleasant Grove, York Road, King's Cross, London, N.

AMMONIA.
Consumers in any form are invited to correspond with Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.

GAS OILS.
MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, Exchange Street, Manchester, and 11, Old Hall Street, Liverpool.

TAR WANTED.
National Telephone 7002. Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS,
Albert Chemical Works, BRADFORD,
MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

A GAS Engineer, member of the Institution of Gas Engineers, well known in Southern and Western Counties, is open to Treat with First-Class Iron or Coal firms as direct REPRESENTATIVE.
Address No. 5025, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

REQUIRED by a Young Man (Age 26) a Position as either RENTAL CLERK or COLLECTOR in the office of a country Gas Company. Has had Six Years' General Experience in the Secretary's office of a large Provincial Gas Company. Can be well recommended.
Address No. 5029, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, for Three Months certain, a good all-round GAS-FITTER for House, Stove Fitting, and Service Laying. Wages 33s. per week of 57½ hours.
Apply at once to the Gas-Works, Dorking.

WANTED, Several Good Superior STREET LAMP MAKERS. Must be First-Class Men.
Apply, by letter, stating Wages required, to No. 5033, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

AGENTS Wanted, calling upon Gas and Water Works and Consulting Engineers in Southern Counties (in other lines), to ACT ON COMMISSION TERMS for Yorks' Contractors and Manufacturers of Gas and Water Plant. Good Incomes can be made by Energetic Gentlemen.
Address No. 5030, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THE Preston Gas Company require the services of an ENGINEERING DRAUGHTSMAN for a period of Three or Four Years.
Salary, £150 per Annum.
Applications, stating Age, Experience, &c., accompanied by *copies* of Testimonials, to be received by the undersigned not later than Wednesday, Dec. 23.
(Signed) Samuel Tagg,
Engineer and Manager.
Gas Offices, Preston,
Dec. 5, 1908.

THE UNIVERSITY OF LEEDS.
(Department of Fuel and Gas Engineering.)
ARRANGEMENTS are being made for the Delivery of the following SPECIAL COURSES of LECTURES, open to all Persons engaged in either of the Industries concerned, provided that the attendance of a certain minimum number of Students be guaranteed.
(*a.*) The Manufacture and Distribution of Coal Gas, on Wednesdays, at Six p.m., and Thursdays, at Nine a.m., during 10 Consecutive weeks commencing Wednesday, Jan. 13, 1909. Fee £1 1s.
Part I.—(Manufacture), Fourteen Lectures by Dr. Harold G. Colman, of London.
Part II.—(Distribution) Six Lectures by Mr. Walter Hole, Superintendent of Gas Distribution for the City of Leeds.
(*b.*) Bye-Product Coking Processes—Six Lectures by Mr. Ernest Bury, M.Sc., of the Brackley Coke Works, near Bolton, Lancs., on Saturdays, at Three p.m., commencing Jan. 23, 1909. Fee 10s. 6d.
Intending Students are requested to send in their names without delay to the Registrar of the University, from whom further Particulars may be obtained.
W. F. Husband,
Registrar.

DRAUGHTSMAN.
WANTED, immediately, by a large Gas Undertaking, an EXPERIENCED DRAUGHTSMAN. Remuneration, £3 Weekly.
Apply, by letter, before Dec. 12, to No. 5031, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ESTIMATING Draughtsman Wanted for Gas-Works Contractor's Office. Must have had good Experience in the Designing and Working of Retort Benches and Conveying Plant.
Apply, by letter only, stating Experience, Age, and Salary required, to No. 5032, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

"AIR as Fuel," Ross (Owen C.D.) or Petroleum and other Mineral Oils Utilized by Carburetting Air and rendering it Inflammable. Second Edition, 12mo., Cloth, London, 1875. Copy of above wanted.
Address 9, Agnew Street, Lytham.

HECKMONDWIKE GAS COMPANY.
TENDERS are invited for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR produced at the Gas-Works for a Period of Twelve Months from the 1st of January, 1909.
Further Particulars and Form of Tender may be obtained on Application to the undersigned.
Tenders, endorsed and addressed to the Chairman, must be delivered by Tuesday, Dec. 15, 1908.
F. D. Richmond,
Engineer and Secretary.
Dec. 2, 1908.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.
THE Directors of the above Company are prepared to receive TENDERS from Iron-Founders, Gun-Barrel Manufacturers, Timber Merchants, Druggists, Rope Makers, &c., for GOODS to be delivered on the Company's Works, Great Brunswick Street, in such quantities as may be required from time to time up to Dec. 31, 1909.
Samples of Goods required are open to Inspection on the Works, Great Brunswick Street, and Printed List of the Articles required can be had on Application to the Company's Offices, D'Olier Street.
Tenders, endorsed "Tenders for Stores," to be lodged in my Office on or before the 27th instant.
Francis T. Colton,
Secretary and Manager.
Head Offices, D'Olier Street,
Dublin, Dec. 5, 1908.

CORPORATION OF LEICESTER.
(Gas and Electric Lighting Department.)
CAST-IRON PIPES.
THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the Supply and Delivery of the necessary CAST-IRON PIPES and CONNECTIONS, from 2 to 36 inches in diameter, required during the Twelve Months ending Dec. 31, 1909.
Specification and Form of Tender can be obtained upon Application to the Engineer.
Tenders, addressed to Mr. Councillor Jennings, Chairman, and endorsed "Tender for Pipes, &c.," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, Dec. 19, 1908.
The Committee do not bind themselves to accept the lowest or any Tender.
Alfred Colson, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane,
Leicester, Dec. 5, 1908.

CORPORATION OF LEICESTER.
(Gas and Electric Lighting Department.)
RETORTS AND FIRE-BRICKS.
THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the Supply and Delivery of RETORTS and FIRE-BRICKS for the Year 1909.
Specification, Quantities, and Form of Tender, can be obtained upon Application to the Engineer.
Tenders, addressed to Mr. Councillor Jennings, Chairman, and endorsed "Tender for Retorts, &c." to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, Dec. 19, 1908.
The Committee do not bind themselves to accept the lowest or any Tender.
Alfred Colson, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane,
Leicester, Dec. 5, 1908.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply of RETORTS, FIRE-BRICKS, &c., required at their various works.

Full Particulars may be obtained on Application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Fire Clay Goods," to be delivered to me not later than Three p.m., on the 17th inst.

L. C. EVANS,
Town Clerk.

Town Hall, Salford.

BRIDGEWATER COLLIERIES COKE-WORKS.
(THE EARL OF ELLESMERE.)

TENDERS are invited for the Tar pro- duced at the above Works for a period of Six or Twelve Months from the 1st of January, 1909, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway; or at the Brackley Siding, Little Hulton Mineral Branch of the London and North-Western Railway.

The estimated quantity is about 2600 Tons per Annum.

Tenders, endorsed "Tender for Tar," to be addressed to Mr. THOMAS M. BROWN, Bridgewater Coal Offices, 4, Chapel Walks, MANCHESTER, not later than the 22nd of December.

Manchester, Dec. 8, 1908.

BOROUGH OF BURTON-UPON-TRENT.

FIRE-CLAY GOODS.

THE Gas and Electricity Committee invite TENDERS for the Supply of the FIRE-CLAY RETORTS, BRICKS, and CLAY required at the Gas-Works during the Year 1909.

Full Particulars of the Specification and Conditions, with Form of Tender, may be obtained on Application to the undersigned, to whom Sealed Tenders, endorsed "Fire-Clay Goods," must be delivered on or before Tuesday, the 29th day of December inst.

The lowest or any Tender will not necessarily be accepted.

R. S. RAMSDEN,
Assistant Manager.

The Gas-Works,
Burton-upon-Trent, Dec. 5, 1908.

WORKSOP GAS COMPANY.

THE Directors of the Worksop Gas Company invite TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve Months commencing the 1st of January, 1909.

Tenders for Tar to state price per Ton delivered into Purchaser's Tanks at the Worksop Railway Station.

Tenders for Liquor to state Price per Ton as tested by No. 1 Twaddel Hydrometer, delivered into Boats near the Company's Works, or price per Ton delivered into Purchaser's Tanks at the Railway Station.

The Directors do not bind themselves to accept the highest or any Tender.

Tenders to be sent in to the undersigned not later than Tuesday, Dec. 29, 1908.

FRANK LUKE,
Secretary.

Beaver Place, Worksop,
Dec. 5, 1908.

CORPORATION OF NOTTINGHAM.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the Supply of the whole or a portion of their Requirements of the following GOODS and MATERIALS, for Delivery during the ensuing Year, carriage paid, at their various Gas Stations, Chemical Works, or Stores, or at any Railway Station within the Nottingham Gas Supply District:—

(*a*)—Cast-Iron Pipes and Specials.
(*b*)—Pig Lead, Lead and Compo. Pipe, White, Red and Chemical Sheet Lead.
(*c*)—Wrought-Iron and Steel.
(*d*)—Retorts and Fire-Clay Materials.
(*e*)—Meters (Wet and Dry and Prepayment); also Repairs.
(*g*)—Brass Cocks and Malleable Iron Levers.
(*h*)—Small Iron Castings, Retort Fittings, &c.
(*i*)—Purchase of Old Cast and Wrought Scrap Iron, Old Copper, Brass, &c.
(*j*)—Lime for Purification and Chemical Works purposes.
(*k*)—Paints.
(*l*)—Oils.
(*m*)—Rope Yarn.
(*n*)—Tallow, &c.
(*o*)—Cotton Waste.
(*p*)—Coke, Forks, Shovels, Buckets, Files, &c.
(*q*)—Meter Boxes, Platforms and Shelves.
(*r*)—Timber.
(*s*)—Plumbing.
(*t*)—Tools Distribution Department.

Specifications and Forms of Tender may be obtained and Samples seen on Application to the Engineer and General Manager, at the Gas Offices, George Street, Nottingham.

Tenders to be addressed to me and delivered at the Guildhall, Nottingham, not later than Thursday, the 17th day of December, 1908.

The Gas Committee do not bind themselves to accept the lowest or any Tender.

By order,
J. A. H. GREEN,
Town Clerk.

TOWN OF TOURNAY (BELGIUM).

NOTICE is Hereby Given, that the time fixed as the 1st of January, 1909, for the receipt, by the Town of Tournay, of all Propositions for the Contract for the LIGHTING of the Town by GAS is EXTENDED until the 1st of February, 1909.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of the Company, so far as they relate to DEBENTURE STOCK, WILL BE CLOSED from the 14th to the 21st of December, 1908, both days inclusive.

The Interest for the Half Year to Dec. 31, 1908, will be payable on the 1st of January to the Proprietors Registered on the closing of the Books.

By order of the Board,
E. TOPLEY,
Secretary.

Chief Offices of the Company:
639, High Road, Tottenham,
Dec. 5, 1908.

HORLEY DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of the Company, so far as they relate to DEBENTURE STOCK and MORTGAGE DEBENTURES, WILL BE CLOSED at Ten o'clock in the Forenoon on Tuesday, the 8th day of December, 1908, for the Half Year ending the 31st of December, 1908, and will be RE-OPENED on Tuesday, the 15th day of December, 1908.

The Interest Warrants for the Half Year will be posted on the 31st of December, 1908, to the Proprietors Registered at the closing of the Books.

By order of the Board,
R. SEYMOUR TOBEY,
Secretary.

Offices: Station Road, Horley,
Surrey, Dec. 5, 1908.

TO MANUFACTURERS OF GAS PRODUCING PLANTS.

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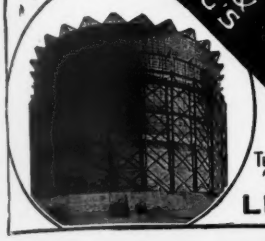

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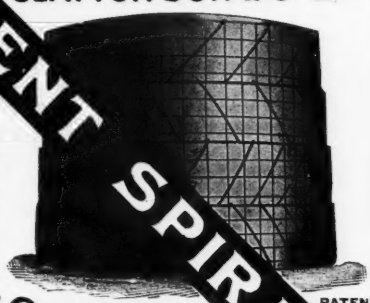

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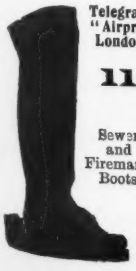

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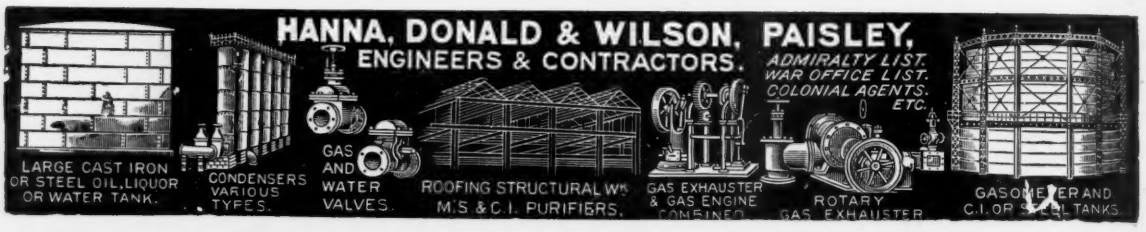

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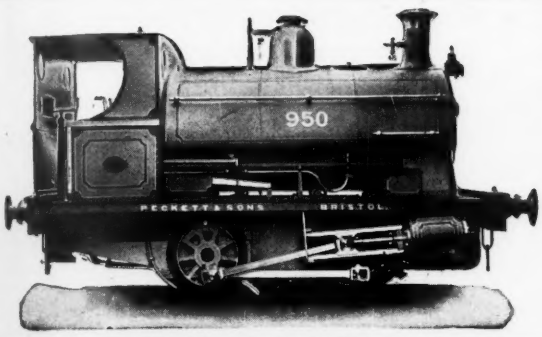

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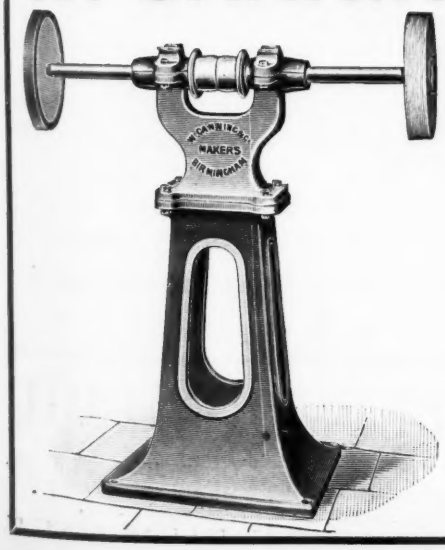

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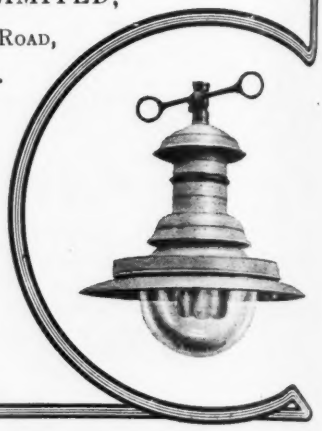

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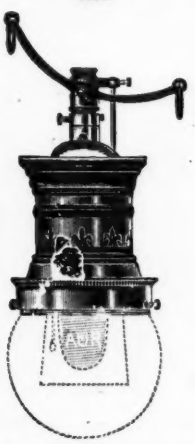

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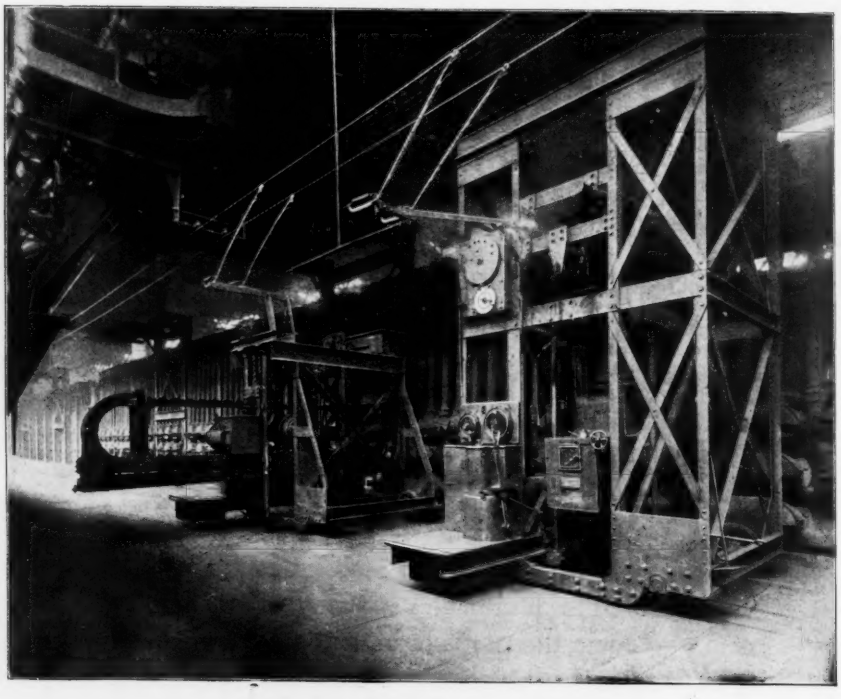

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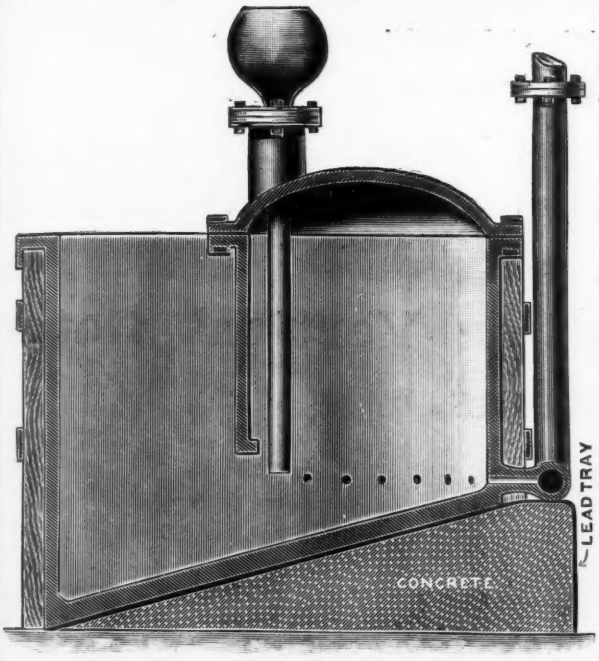

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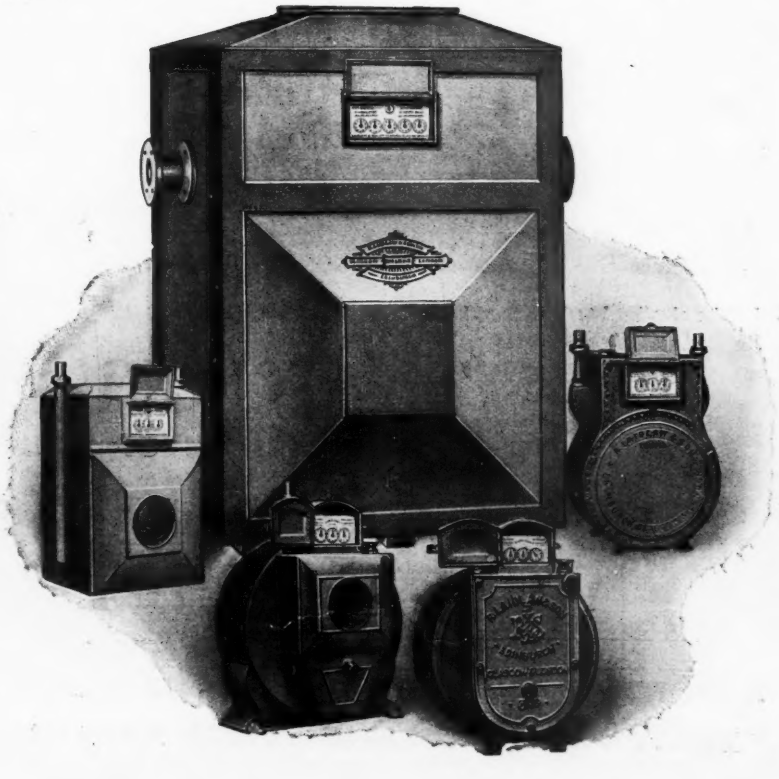

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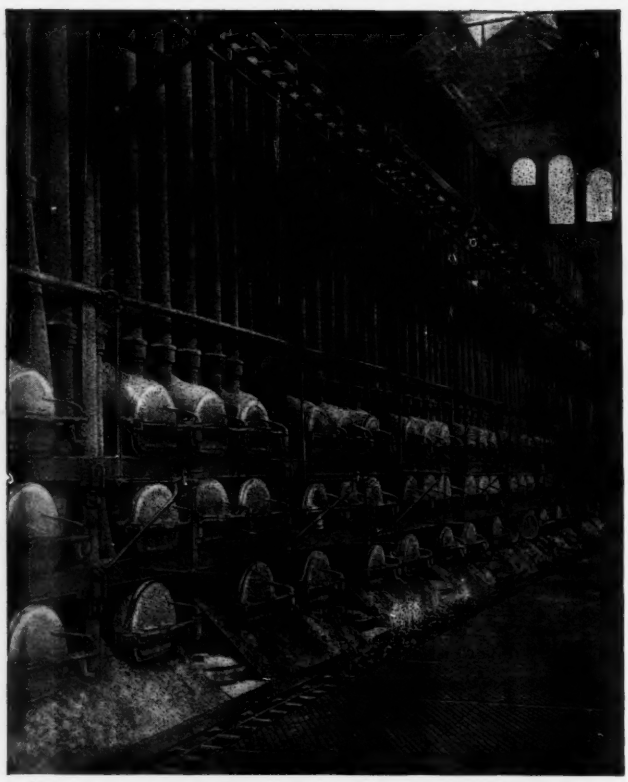

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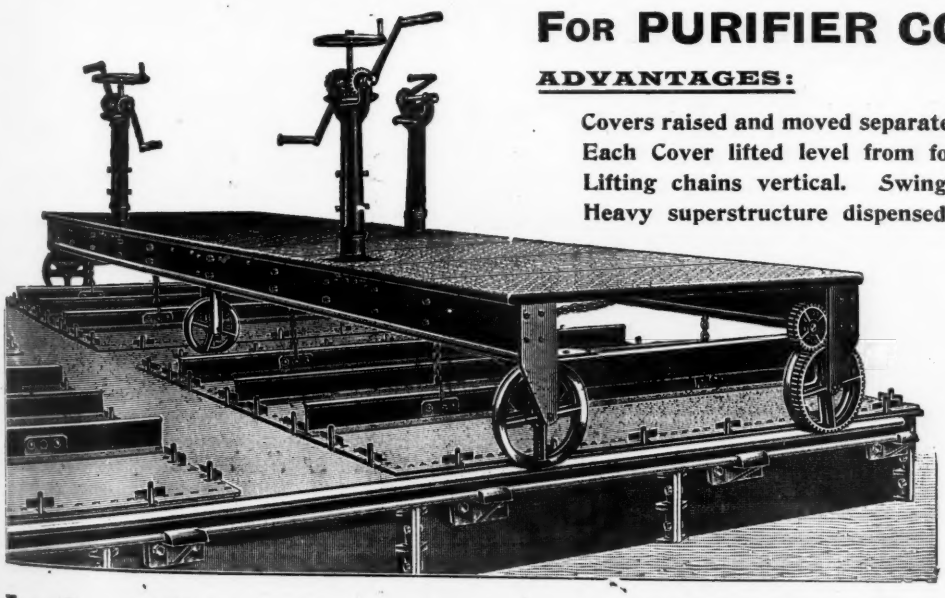

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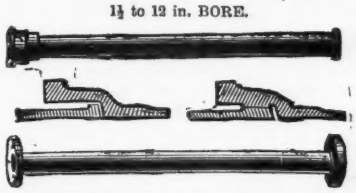

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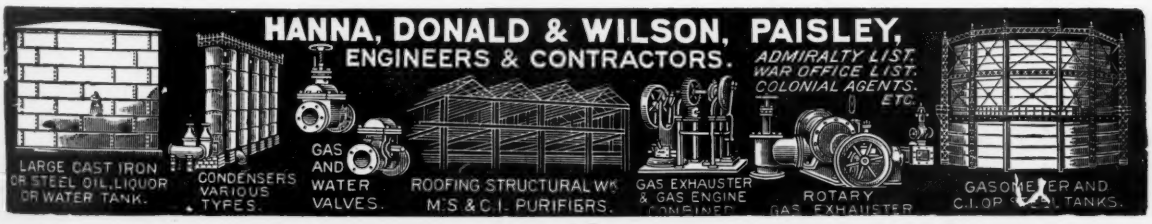
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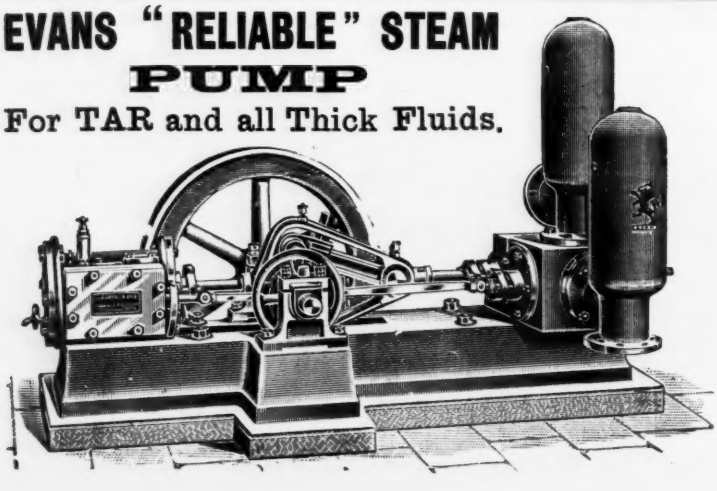

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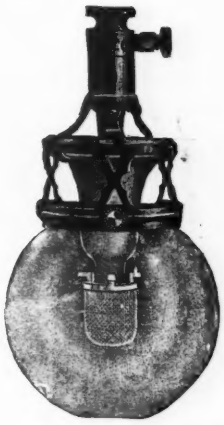

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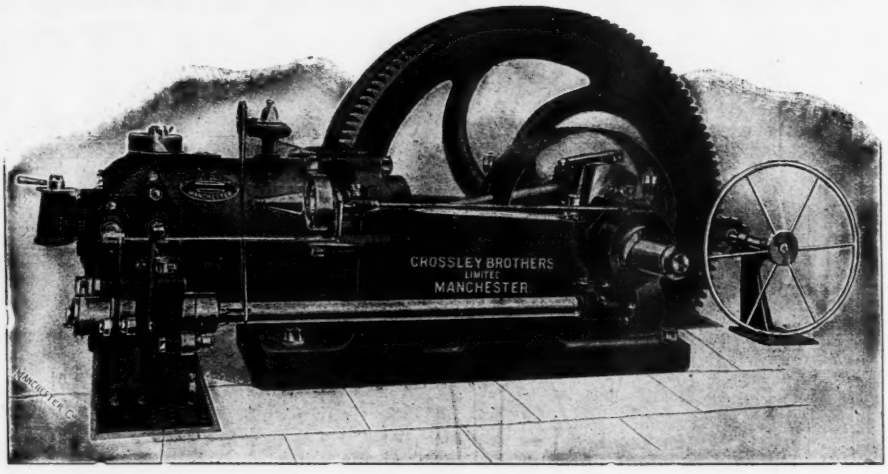

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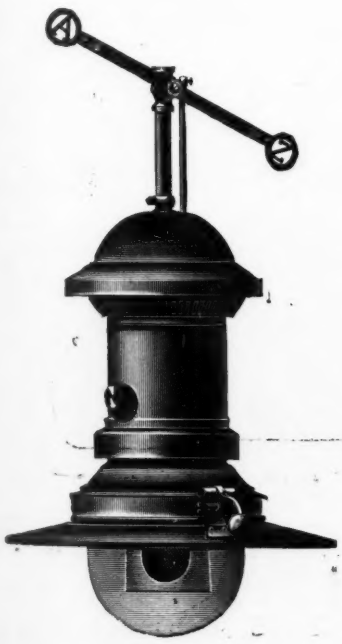

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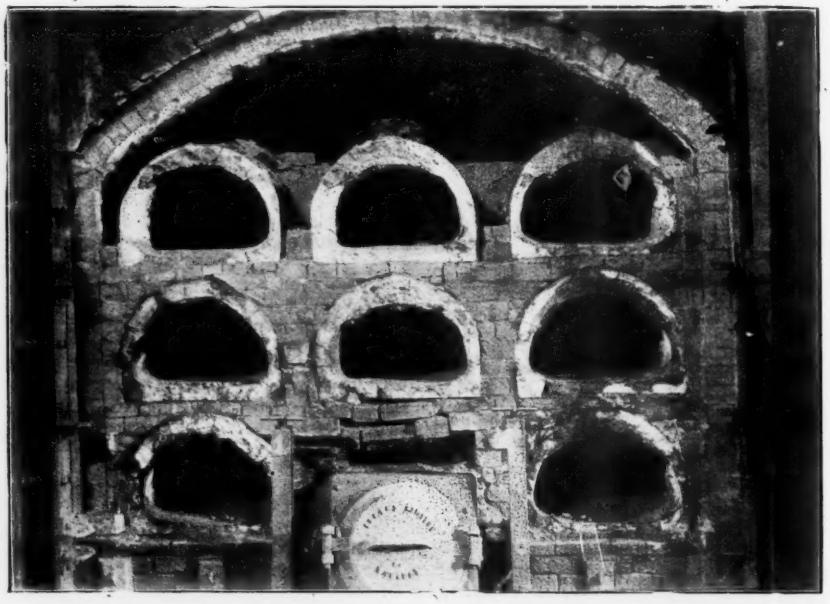

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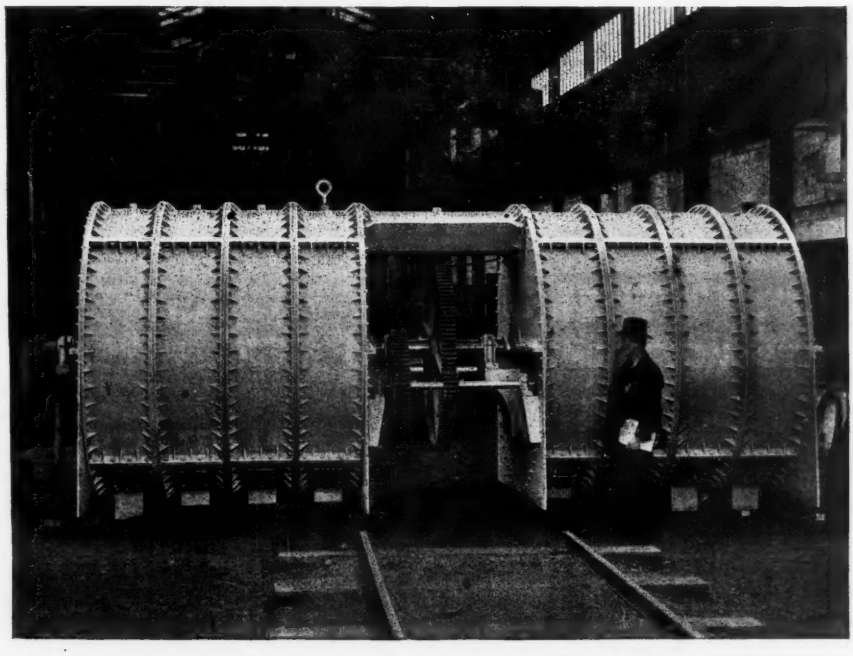

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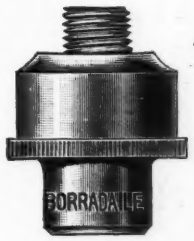

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